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Commercial Fisheries Abstracts

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

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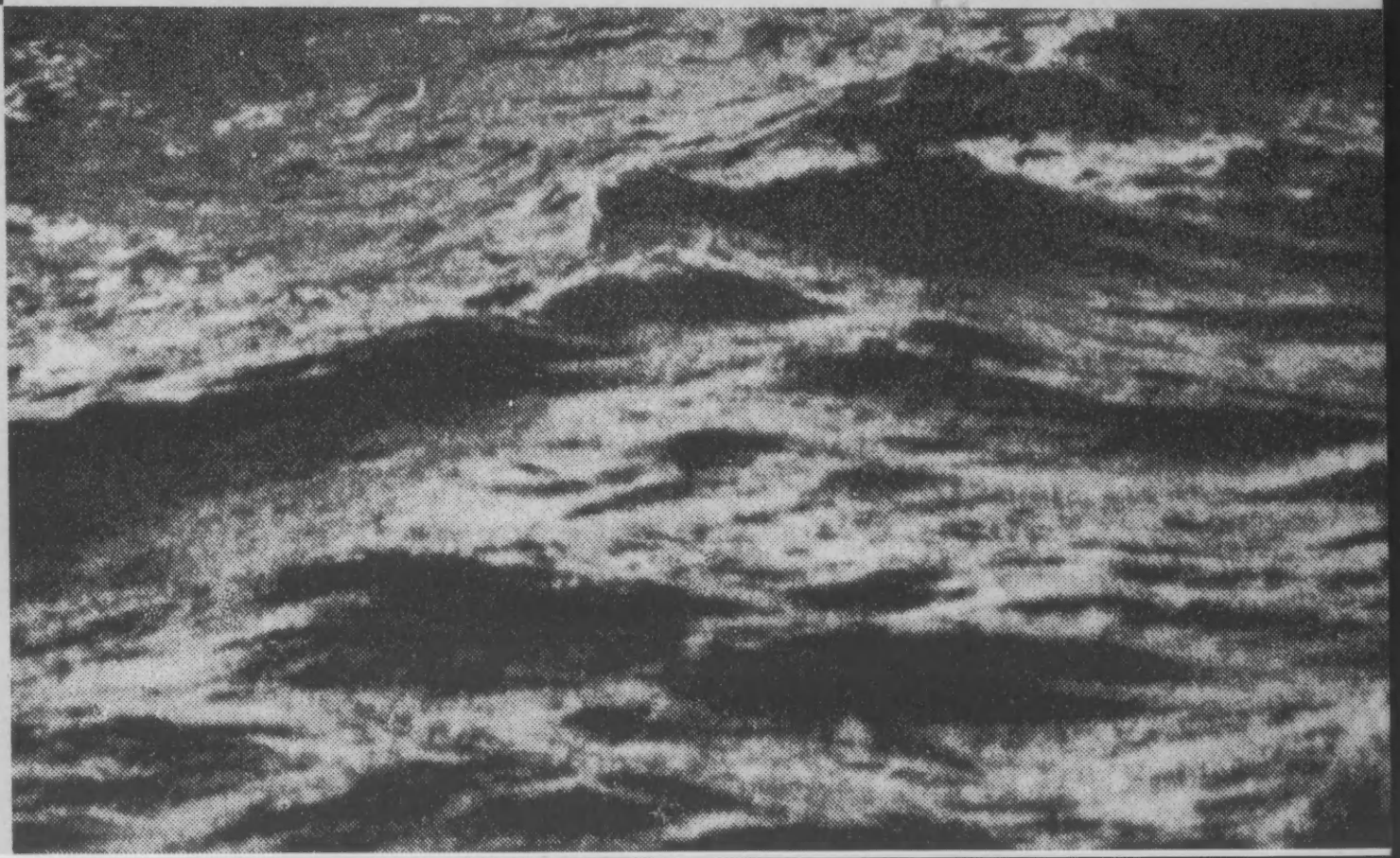

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UNITED STATES DEPARTMENT OF COMMERCE
Peter G. Peterson, *Secretary*

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
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NATIONAL MARINE FISHERIES SERVICE
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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Commercial Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Commercial Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

For sale by the Superintendent of Documents, U.S. Government Printing Office Washington, D C 20402 - Subscription price: $3.50 per year ($1.00 additional for foreign mailing). Cost per single issue - $0.35.

0.33 A BINDING PROTEIN FOR FATTY ACIDS IN CYTOSOL OF INTESTINAL MUCOSA, LIVER, MYOCARDIUM, AND OTHER TISSUES

Ockner, Robert K., Joan A. Manning, Ruth B. Poppenhausen, and William K. L. Ho (Department of Medicine, University of California School of Medicine, San Francisco, CA 94122)
Science 177, No. 4043, 56-58 (July 7, 1972)

Translocation of fatty acids from cell surface to endoplasmic reticulum and mitochondria is fundamental to the absorption of lipids in the intestine and to utilization of fatty acids in plasma by liver, muscle, and other tissues. Although long chain fatty acids are poorly soluble in aqueous media, a mechanism to account for the ease with which they traverse the cytosol (aqueous cytoplasm) was unknown.

In studies of the intestinal absorption of long chain fatty acids, apparent differences in esterification rates of saturated and unsaturated fatty acids were postulated to be due to different rates of their translocation from the microvillus membrane [of the intestine] to the site of their activation in the endoplasmic reticulum.

An investigation of these differences resulted in the discovery of a protein, which binds long chain fatty acids and certain other lipids, in the cytosol of jejunal mucosa, liver, myocardium, adipose tissue, and kidney. Binding is noncovalent and is greater for unsaturated than for saturated and medium chain fatty acids.

Binding of long chain fatty acids by this protein is greater than that of other anions tested, including sulfobromophthalein, and it does not depend on negative charge alone. Binding appeared to be related to length and saturation of

(over)

0.35 ON THE BIOSYNTHESIS OF INSULIN IN ANGLERFISH ISLETS

Yamaji, Kenji, Kozue Tada, and Anthony C. Trakatellis (Department of Biochemistry, Mount Sinai School of Medicine of the City University of New York, New York, NY 10029)
Journal of Biological Chemistry 247, No. 12, 4080-4088 (June 25, 1972)

Earlier work has shown that insulin is synthesized via a single chain precursor or proinsulin. A. C. Trakatellis and G. P. Schwarts [Nature 225, 548-549 (1970)] described the participation of a proinsulin in insulin biosynthesis in anglerfish islets and the isolation and composition of anglerfish proinsulin. In the present paper, the authors report the isolation and determination of structure of a key intermediate form derived from proinsulin in its conversion to insulin. The intermediate has the structure of insulin with the additional amino-acid residues Gly-Thr-Lys attached to the NH_2 terminus of the A chain. The intermediate can be produced *in vitro* by a rapid tryptic enzyme cleavage of anglerfish proinsulin. More extensive treatment with trypsin converts the intermediate to insulin.

The authors propose that the biosynthesis of insulin in the islets of anglerfish proceeds through two sequential steps: a rapid enzymic hydrolysis of proinsulin to yield an intermediate and then a slow hydrolysis of the insulin intermediate to produce insulin. Also, they suggest that it is possible that one trypticlike enzyme operates in both steps.

[16 figures, 4 tables, 22 references] FTP

0.39 DAILY VARIATION IN CONCENTRATION OF CORTISOL IN PLASMA IN INTACT AND HYPOPHYSECTOMIZED GULF KILLIFISH

Srivastava, Anil K., and Albert H. Meier (Department of Zoology and Physiology, Louisiana State University, Baton Rouge, LA 70803)
Science 177, No. 4044, 185-187 (July 14, 1972)

The adrenocortical (interrenal) tissue of teleost fish is stimulated by adrenocorticotropic hormone (ACTH) secreted by the anterior lobe of the pituitary gland. Hypophysectomy results in a decrease in the plasma concentration of cortisol, the major corticosteroid in poeciliid fishes, and a regression of the adrenocortical tissue. Daily rhythms in the concentration of plasma glucocorticoids have been reported for teleosts. Other work has indicated that daily rhythms of adrenal steroids in mammals are synchronized by the photoperiod; furthermore, rhythms in concentration of the glucocorticoids in plasma are thought to be direct consequences of daily rhythms of ACTH release. If this assumption is correct for teleosts, hypophysectomy should not only cause a reduction in concentrations of cortisol in plasma but also should result in a loss of the daily rhythm. This assumption was tested in the following manner.

Two groups of intact fish, and two groups of hypophysectomized fish were maintained on a 12-hr. daily photoperiod; one group of each category was exposed to light beginning at 0800 (series 1), and the remaining group from each category was exposed at 2000 (series 2). After 15 days the fish were killed at intervals of 4, 8, and 12 hr. After the onset of light, the concentration of cortisol in the plasma of each fish was determined by the corticosteroid-binding globulin method.

(over)

0.38 (0.35) REDUCED PYRIDINE NUCLEOTIDE BINDING TO BEEF LIVER AND DOGFISH LIVER GLUTAMATE DEHYDROGENASES

Malencik, Dean A., and Sonia R. Anderson (Department of Biochemistry and Biophysics, Oregon State University, Corvallis, OR 97331)
Biochemistry 11, No. 15, 2766-2771 (July 18, 1972)

This paper reports on fluorescence and circular dichroism studies of the binding of NADH (nicotinamide adenine dinucleotide, reduced form) and NADPH (nicotinamide adenine dinucleotide phosphate, reduced form) to BL-GDH (beef liver glutamate dehydrogenase), in the presence and in the absence of the effectors GTP (guanosine 5′-triphosphate) and ADP (adenosine 5′-diphosphate). Parallel experiments with Pacific dogfish liver glutamate dehydrogenase (DF-GDH), a nonassociating form of the enzyme, were carried out in order to examine the role of association in coenzyme binding. Comparative examination of the two enzymes is interesting, the authors indicate, because the dogfish is a primitive vertebrate, having diverged from the main vertebrate evolutionary line about 400 million years ago. BL-GDH binds six moles of NADPH in the presence and in the absence of GTP. There are multiple sites for NADH. In the presence of GTP, 18 sites/hexamer were fluorometrically titrated. Six of these sites are equivalent to the NADPH binding sites. The coenzyme binding equilibrium of BL-GDH is independent of the concentration of protein in the range tested of from 0.2 to 2 mg./ml. DF-GDH, a nonassociating form of the enzyme, is NAD^+ (H) specific but shows the same heterogeneity in the binding of NADH.

[9 figures, 1 table, 29 references] FTP

0.35 (9.13) GROWTH HORMONE- AND PROLACTIN-LIKE PROTEINS OF THE BLUE SHARK (PRIONACE GLAUCA)

Lewis, U. J. (Division of Endocrinology, Scripps Clinic and Research Foundation, La Jolla, CA 92037), R. N. P. Singh, B. K. Seavey, R. Lasker, and Grace E. Pickford
Fishery Bulletin 70, No. 3, 933-939 (July 1972)

The two major disc-electrophoretic components, designated as "slow" and "fast," which are seen in fresh homogenates of the pars distalis of the blue shark (Prionace glauca) pituitary gland were isolated. Some alteration of the proteins occurred during the purification as evidenced by appearance of a slightly faster migrating band in each. The slow component and its altered form had a molecular weight of 22,000 daltons; the fast, and its modified form, 20,000 daltons. The two proteins were very similar chemically and immunologically, but definite differences were noted. Both gave a precipitin line with antiserum to mouse growth hormone, although quantitatively different, but neither reacted to antiserum to mouse prolactin. The peptide maps of the two proteins were identical except for three peptides. Both contained two moles of tryptophan and six half-cystine residues. These results indicate that the pars distalis of the blue shark contains two very similar proteins that resemble both growth hormone and prolactin of mammals.
[7 figures, 1 table, 14 references] Authors' abstract

0.38 ISOLATION AND PROPERTIES OF LUCIFERASE, A NON-HEME PEROXIDASE, FROM THE BIOLUMINESCENT EARTHWORM, DIPLOCARDIA LONGA

Bellisario, Ronald, Terry E. Spencer, and Milton J. Cormier (Department of Biochemistry, University of Georgia, Athens, GA 30601)
Biochemistry 11, No. 12, 2256-2266 (June 6, 1972)

Earlier work has demonstrated that luciferin, luciferase, and H_2O_2 are required for the in vitro emission of light from the earthworm D. longa, expressed as follows:

$$\text{luciferin} + H_2O_2 \xrightarrow{\text{luciferase}} \text{light} + \text{products}.$$

In this paper, the authors present evidence that luciferin and luciferase are located within the coelomic cells of the bioluminescent earthworm. The blue-green luminescence, arising from the coelomic fluid exuded by the worm following mechanical or electrical stimulation, has an unstructured peak emission at 19,700 cm^{-1} (507 nm) with a half-width of 3,070 cm^{-1} (78 nm). The highly purified form of luciferase isolated from the coelomic cells of D. longa had an approximate molecular weight of 300,000, and the enzyme appears to be highly asymmetric. Its absorption and fluorescence spectra are those of a typical protein. The enzyme is irreversibly inactivated by H_2O_2, and one molecule of H_2O_2 per luciferase site apparently is required for this inactivation. Therefore, luciferase during the light reaction does not exhibit normal enzymatic catalysis.
[12 figures, 3 tables, 37 references] FTP

0.33

fatty acid chains which indicates that the interaction between them and the protein may be steric and/or hydrophobic.

The presence of this binding protein may explain differences in rates of intestinal absorption among fatty acids; furthermore, the protein may participate in the utilization of long chain fatty acids and lipid soluble drugs and toxins by many mammalian tissues.
[1 figure, 1 table, 15 references] SW

0.39

The results indicated that daily variation in concentrations of cortisol in plasma occurred in both categories of fish, which proves that the pituitary is not required for this variation; instead, the authors suggest that it is synchronized by the daily photoperiod.

The concentrations of cortisol in plasma of intact fish in series 2 was higher compared to the same category in series 1. The adjustment of an animal to the inverted photoperiod (2000 to 0800) might constitute a stress that is expressed as an elevation of cortisol in plasma. This reaction did not occur in hypophysectomized fish in series 2. The authors suggest that the stress response depends on the presence of the pituitary, whereas the rhythm of cortisol concentrations in plasma does not.

The retention of adrenal function of hypophysectomized fish (indicated by cortisol in the plasma) during the experiment was helpful in demonstrating that control of daily rhythm of cortisol in plasma is not dependent on the hypophysis.
[1 figure, 1 table, 16 references] SW

0.33 (6.32) INTERACTION BETWEEN RED SEAWEED MUCILAGE AND ACRIDINE BASES

Akahane, Tooru, and Kakuji Katsuura (Numazu Tech. Coll., Numazu, Japan)
Chemical Abstracts 76, No. 23, 137231q (June 5, 1972)

0.38 ROLE OF THE REDUCED DIPHOSPHOPYRIDINE NUCLEOTIDE IN THE REACTIVATION OF DOGFISH MUSCLE LACTATE DEHYDROGENASE

Levi, Alan S., and Nathan O. Kaplan (Dep. Chem., Univ. California, La Jolla, Calif.)
Chemical Abstracts 76, No. 9, 43314s (Feb. 28, 1972)

0.35 (9.12) NEW OBSERVATIONS ON THE LIPIDS OF AQUATIC ORIGIN

Yamada, Minoru (Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Memoirs of the Faculty of Fisheries Hokkaido University 19, Nos. 1/2, 35-136 (1972) (Publication Committee, Faculty of Fisheries, Hokkaido University, Minato-cho, Hakodate,040, Japan)

The purpose of this study was to obtain background information leading to a better understanding of how the fatty acids characteristic of the marine fishes are produced; through what pathway the lipids which contain large amounts of wax esters, as in sperm whale oil, are produced; how the large amounts of higher hydrocarbons, as found in shark liver oil, are produced; and how large amounts of acyl glyceryl esters, as in the lipid of certain marine organisms, are produced. In addition, elucidation of the functions of these lipids in the marine organisms was desired. Data were also collected on the general properties--fatty acid composition and the unsaponifiable matter--of the lipids of the plankton upon which the fishes fed. The lipids of 14 marine teleosts, 4 fresh-water teleosts, 1 elasmobranch, 2 cephalopods, and 1 shellfish were examined. The lipids of 15 species of plankton were examined.
[41 figures, 85 tables, 99 references] FTP

0.6 (0.35) RAPID ROUTINE TESTS FOR PORK SAUSAGES

Pearson, D. (National College of Food Technology, Weybridge, England)
Food Manufacture 47, No. 4, 45-46, 53 (Apr. 1972)

Statutory standards require factory control laboratories to examine increasing numbers of samples. If more rapid techniques were available in performing analyses for standard qualities there would be savings in time and other costs. The author applied techniques for determining total meat content (65% minimum), and sulfur dioxide (450 p.p.m. maximum) in pork sausage, which were more rapid than conventional methods. The results of these tests correlated reasonably well with results obtained using recognized reference methods. He also suggested rapid techniques for determining water, fat, protein, and ash. The author suggests very strongly that meticulous care should be taken in preparing a good homogeneous sample of any meat product for tests.
[1 figure, 10 references] SW

0.6 (KRILL) PROTEIN FIELDS IN THE ANTARCTIC

Korotky, R.
Nutrition, Lond. 26, No. 1, 41-42 (1972)
BFMIRA Abstracts 23, No. 6, Abstract No. 2097, 424 (June 1972)

This is a short report, translated from Russian, on the occurrence, general composition and flavour of krill. L.P. Reprinted

0.6 UTILIZATION OF SOYBEAN PRODUCTS IN FISH PASTE PRODUCTS

Yasumatsu, Katsuharu, Masaru Misaki, Toshio Tawada, Koshichi Sawada, Jun Toda, and Kiyofumi Ishii (Food Research Laboratories, Food Products Division, Takeda Chemical Industries, Ltd., Osaka, Japan)
Agricultural and Biological Chemistry 36, No. 5, 737-744 (May 1972)

Certain commercially available food-grade soybean products are used in the production of kamaboko, chikuwa, fish sausage, and certain fish paste products. The purpose of the present work was to examine the quality of kamaboko when prepared from various commercial soybean products. An attempt was made to correlate the various chemical and physical characteristics of the soybean products with the quality of the kamaboko prepared from these products. Forty-three soybean products were used in the tests; 6 soy protein isolates, 10 soy protein extracts, 7 soy protein concentrates, and 20 soy flours. All were in the form of a powder. Frozen surimi of suketō-tara Theragra chalcogramma, without added salt, was used. The frozen surimi was thawed. Salt to a level of 2.5%, soybean product to a level of 5%, and water to a level of 10% were added to the thawed surimi. The mixture was then ground for 10 min. in a mill. The ground material was stuffed into casings and the sausages were heated in hot (85° C.) water for 50 min. The cooked sausages were cooled in water then stored for 1 day at 5° C. The kamaboko, prepared in this manner, was used as the test sample. It was found that the quality of the kamaboko varied with the batch of surimi used. Therefore, the kamaboko prepared from one specific soy protein concentrate was used as the standard reference sample; all test samples were compared with the standard reference samples. Quality of the kamaboko was measured by sensory and objective tests. Sensory

(over)

0.8 EFFECTS OF MICROWAVES ON FOOD AND RELATED MATERIALS

Rosen, Carl-Gustaf (University of Stockholm, Sweden)
Food Technology 26, No. 7, 36-37, 39, 40, 55 (July 1972)

The author discusses the possible interactions of microwaves on food and similar material.

The quantum energy of microwaves is too low to cause any chemical changes due to the direct interaction with molecules and chemical bonds. It is possible that the electric field associated with microwaves might cause electric orientation effects on subcellular particles, and thus may disturb cell division. These influences are probably of medical significance, and they may not have a lasting impact on microwave-heated food. However, in microwave-accelerated freeze-drying of foods, the corona discharge (which develops under vacuum conditions) may induce undesirable chemical reactions in the foods.

Information to date indicates that the effects of microwaves on biological materials is of thermal origin.
[2 tables, 14 references] FTP

0.6

evaluations were made for color, flavor, texture, and overall quality. The Okada Gelometer was used to obtain values for breaking stress, breaking strain, breaking work, softness, and penetrating rate. The Texturometer was used to obtain values for hardness, cohesiveness, springiness, and gumminess.

The kamaboko samples containing added soy protein isolates had high texture scores and low color ratings; the samples with added soy protein concentrates had high texture scores and color ratings; the samples with added soy protein extracts had low texture scores and color ratings; and samples with added soy flours had low texture scores and color ratings. The textural quality of the kamaboko varied directly with the amount of protein supplied by the soybean product. No correlation was found between texture of the kamaboko and the amount of fiber or fat in the soybean products. There was positive correlation between the "hardness" of the kamaboko and the degree of denaturation of the protein of the added soybean products and with the amount of nitrogen of the soybean products not dispersible in 3% sodium chloride solution. No correlation seemed to exist between the textural properties of kamaboko (containing added soybean products) and the textural properties of the heat-coagulated gels of the corresponding soybean products.
[5 figures, 6 tables, 9 references] FTP

0.6 FOOD FLAVORING CONCENTRATES

Moeller, Hans G. (Dragoco Spezialfabrik Konz. Riech-Und Aromastoffe Gerberding und Co. G.m.b.H. (pat.)
German Patent 1,908,900
Chemical Abstracts 76, No. 25, 152330q (June 19, 1972)

0.8 (9.16) TEMPERATURE CONTROL SYSTEM FOR RECIRCULATION FISH-HOLDING FACILITIES

Scott, K. R. (Fisheries Research Board of Canada, Freshwater Institute, Winnipeg, Manitoba R3T 2N6, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 7, 1082-1083 (July 1972)

The temperature control system described here can be adapted to existing recirculating fish-holding facilities. It will maintain temperatures within ±0.06° C. within the range of 2° to 20° C. in two 200-gal. tanks (using a modulating electronic temperature controller). Heating and cooling are done in a stainless-steel combination cooler-and-heater unit; heating is by an electrical resistance element and cooling is by a water-cooled hermetic refrigeration compressor. The unit includes heating, refrigerating, filtrating, and aerating devices.
[3 figures, 1 table, 2 references] FTP

0.7 DIETARY MANIFESTATIONS OF FLUORIDE FROM FISH PROTEIN CONCENTRATE ON THE MOUSE DENTITION

Kerley, Michael A. (Texas A & M Univ., College Station, Tex.)
Chemical Abstracts 77, No. 1, 1326n (July 3, 1972)

0.4 (2.9) DEVELOPMENT OF SENSITIVITY TO TETRODOTOXIN IN BEATING CHICK EMBRYO HEARTS, SINGLE CELLS, AND AGGREGATES

McDonald, Terence F., Howard G. Sachs, and Robert L. DeHaan (Department of Embryology, Carnegie Institution of Washington, Baltimore, MD 21210)
Science 176, No. 4040, 1248-1250 (June 16, 1972)

Earlier work has shown that tetrodotoxin specifically blocks inward sodium current in certain excitable tissues (including heart tissue) and abolishes spontaneous activity in cells in which the action potential is dependent on a transient increase in sodium conductance. Such a mechanism is involved in the generation of action potential in the embryonic chick heart--the inward sodium current in the heart (adult) tissue is blocked by tetrodotoxin. In the present study, the effect of tetrodotoxin on the spontaneous beating of chick embryo heart preparations (whole hearts, single isolated cells, and aggregates of dissociated cells) were examined.

It was found that: (1) Chick embryo hearts, at 4 days of age, are not sensitive to tetrodotoxin a 10^{-5} g./ml. (3×10^{-5} M), but they were increasingly sensitive to the toxin between 4 and 7 days, after which their sensitivity remained constant; (2) only a small fraction of the isolated cells were sensitive to tetrodotoxin, and the sensitivity of the fraction did not increase with the age of the embryo; and (3) the aggregates formed from single cells responded to tetrodotoxin similarly to the response shown by the intact embryonic heart.
[2 tables, 26 references] FTP

0.7 FEEDING POULTRY MANURE TO ANIMALS

Couch, J. R. (Department of Poultry Science, Texas A&M University, College Station, TX 77840)
Feedstuffs 44, No. 31, 24-26 (July 31, 1972)

Dehydrated poultry waste (DPW) consists of feces collected from hens held in laying cages and not contaminated with litter. The feces are dehydrated in a rotary-type drum dryer. Research into the addition to feeds of DPW was reviewed. DPW can be fed to laying hens without detrimental effects on their health or to the flavor of their eggs. DPW has a low energy content and the nutrients it contains are not fully utilized. The laying hen eats to satisfy energy requirements. Consequently feed consumption increased proportionately in relation to the percentage of DPW in the diet in order to satisfy calory needs. High phosphorus content with associated amino acids makes DPW a preferred source of phosphorus. Because of low energy content, DPW in feeds for broilers and turkeys is not indicated. The author concluded that inclusion of DPW in a feed formula for poultry increases feed consumption, lowers feed efficiency, and increases feces production.

Results from research on swine indicated that no more than 5% DPW should be included in rations to avoid adverse effects on growth rate and feed conversion. The author corresponded with 40 nutritionists to ascertain the usefulness of DPW. There was unanonymous agreement that the best use of DPW is in rations for ruminants (cattle and sheep). The rumen of these animals contains bacteria capable of converting nonprotein nitrogen to bacterial nitrogen which can be used by the host animal.
[14 references] SW

1.0152 SEAFOOD EXPORT JOURNAL (ANNUAL NUMBER)

Published by M. G. Mathew, Secretary, Seafood Exporters Association of India, X11/125 A, Jew Town Road, Cochin, Kerla, India (Jan. 1972), Vol. IV, No. 1. Price 100 Rupees

This journal is the publication of the Seafood Exporters Association of India. The annual number is a medium for publishing all aspects of the Indian fisheries. A list of the titles in the annual number is as follows:

"Export Outlook for Indian Marine Products," by C. Cherian; "Are There Enough Shrimps in the Sea?" by S. Z. Qasim; "Fisheries Development in India" by R. Raghu Prasad; "Zebra Fishes Pteroiinae: Scorpaenidae Value as Aquarium Fishes" by K. V. Ramo Rao; "The Shrimp Zoom" by Robert S. Russel; "Some Microbiological Problems Associated With Fish Sausage Manufacture" by J. R. Yermal, T. S. M. Dasai, T. C. Chandrasekhar, Gopalakrishnia Shenoy; "Brighter Prospects Ahead" by Edward Rivlin; "Net Economic Yield and the Problem of Over-Fishing With Particular Reference to Shrimp Fishery Off Karala Coast" by B. S. Saxena; "Credit for Fishing Industry" by K. S. Bhullar; "Are Our Mechanical Fishing Boats Viable" by A. Sachidanandam; "More Fish From Deep Sea" by Shri. H. G. Vartak; "A Suggestion to Practice Shrimp Farming To Augment the Raw Material Supply for the Seafood Industry" by C. T. Samuel; "Why a Professional Degree Course in Fisheries" by K. V. Sekharan; "Survey of India's Export Potential of Marine Products by the Indian Institute of Foreign Trade-An Analysis" by S. V. Goghale; "Scientific Utilization of Fishery Wealth Imperative" by Irving P. Farber; "A Profile of the Deep Sea Fishery Resources Off the Southwest Coast of India" by K. M. Joseph; "A Review of the Program

(over)

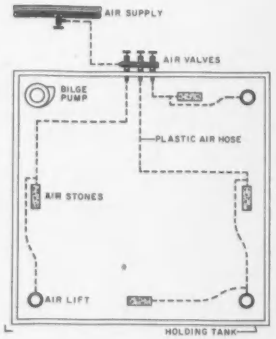
2.15 SHIPBOARD PROCEDURES TO DECREASE LOBSTER MORTALITY

Smolowitz, Ronald Joel (NOAA Corps, National Marine Fisheries Service, Woods Hole, MA 02543)
Commercial Fisheries Review 34, Nos. 5-6, 44-48 (May-June 1972)

The development of the offshore lobster fishery has created a need to decrease lobster mortality during long periods of storage onboard ship. This paper discusses aspects of the shipboard-storage problem and presents one successful method now in operation.

The major causes of lobster mortality after capture are: a) suffocation, b) thermal shock, c) rough handling, and d) disease.

Diagrams of a holding tank air system and of a deck holding tank follow.



HOLDING TANK AIR SYSTEM
(Layout of the air system at the bottom of the tank)

2.1 GRID SORTERS AID CONSERVATION OF ROCK LOBSTER
(1.87)

Anonymous
Australian Fisheries 31, No. 6, 8-9 (June 1972) (Reprinted from South African Shipping News)

Until recently the contents of lobster traps were dumped on the deck where they were later sorted. The undersized lobsters were returned to the sea. Delays between emptying the trap and sorting resulted in injury of lobsters due to exposure to the sun, and many were physically damaged by the crush on deck. The lobsters which lay longest on the deck were those nearest the legal minimum size because they had to be measured. It was estimated that these lobsters were exposed to the most injury and constituted a large proportion of the following season's crop. In a single season the average boat caught about 40,000 rock lobster for processing but probably returned between 200,000 and 300,000 lobsters below the legal minimum size.

Traps with escape gaps were used to overcome the capture of undersize lobsters. However, when the trap contained more than a certain amount of lobsters, the escape gaps were inaccessible to many of the undersized individuals. These undersized lobsters were brought to the surface, sorted (and often injured), and returned to the sea.

To mitigate the problem of injury to the undersized lobster a South African rock lobster catching and processing firm has caused to be developed a deck-mounted sorting grill. The catch from a trap are exposed to the grid, and the undersize lobsters escape through gaps in the grid to the sea without handling.

(over)

2.119 STUDIES ON THE ICE ACCUMULATION ON SHIPS.
III. ON THE PREVENTION OF ICING ON SHIPS BY MEMBRANOUS WATER

Morimura, Shinji (Laboratory of Fishing-Boat Industry, Faculty of Fisheries, Hokkaido University)
Bulletin of the Faculty of Fisheries Hokkaido University 23, No. 1, 29-38 (May 1972)

This paper briefly describes laboratory and field tests aimed at developing a means of preventing the icing on ships at sea. The concept involved the use of a running, continuous ("membraneous") film of heated water flowing over that surface of the vessel affected by icing. Tests in the laboratory were made on stainless-steel and rubber sheeting surfaces. Field tests were made on an offshore dragnet boat and a pelagic trawler. The cooling water from the vessels' engines was used to provide the running water film. Rubber sheeting was applied to the vessels. The heated water is flowed over the surface of the sheeting to prevent icing. According to the author, on one of the fishing vessels the running water area was maintained in a safe condition as far as icing was concerned under conditions of -5° C. air temperature, 0° C. sea-water temperature, and 4 on the Beaufort wind scale. The water applied at the upper edge of the diffusive rubber sheeting (for prevention of icing) was 35° C. and reached a temperature of only 27° C. at the lower edge. The author believes that these tests indicate that the concept may eventually be applied in the prevention of icing aboard ship.
[6 figures, 1 table, 4 references]

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2.1 (1.87)

The grid measures 3 ft. by 5 ft. with steel bars spaced 2 in. apart. The grid is made of tubular steel and light sheet metal or hardboard. It is mounted with a chute running from the grid to a hole in the gunwale. When the trap is hoisted aboard it is held above the grid onto which the lobsters are released. Undersize lobsters drop through the grid unassisted, those of legal size are removed by hand, and those near the legal size are measured and retained or released to the sea immediately.

Experiments were performed with the grid and traps to determine how effective either system is in conservation of the lobster fishery. Results of the experiments indicated that traps with escape gaps released about half of the undersize lobsters that would have escaped through the sorting grid. All the company's 20 boats are now fitted with the sorting grids.

[1 photograph]

SW

2.1121 MAKING AND MENDING NETS. PART 8--TORN-OUT BELLIES AND MENDING IN "SHOOTERS"

Anonymous
World Fishing 21, No. 5, 54-55 (May 1972)

A trawl that has an area torn completely out is repaired by working into the edges of the remaining net a new section of netting, known as a shooter. The size of the shooter is calculated; an illustration shows the trimming of the old net and the mending required to install the shooter.

[1 figure]

SW

2.1121 MAKING AND MENDING NETS. PART NINE: CONCLUDING THE MENDING-IN OF SHOOTERS, AND GOING ON TO REPAIR THE LOWER WINGS AND BOSOM

Buckingham, Harry
World Fishing 21, No. 6, 28-29 (June 1972)

When the new net has been joined across the widest part of the damaged net, the selvedge must be mended in. An illustration shows how to cut selvedge out of sheet netting. Mending a torn net with staples still intact is also illustrated; mending a small rip along the flymeshes is described.

There are illustrations and a description on repairing a net that has had the quartermesh torn out, with the bosom meshes, and fly meshes on either side of the bosom quartermesh completely.

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[4 diagrams]

1.0152

for the Development of Marine Products in the State With Special Reference to Exports" by S. P. Balasubrahmanyan; "Basic Food From the Sea" by C. P. Gopinathon; "Culture of Predatory Fishes" by K. H. Menon; "An Answer to the Problem of Protein Starvation" by N. Balakrishnan Nair; "Recent Trends of Research in Coastal Aquaculture" by V. Gopalakrishnan; "Fishing Boats Out of Steel and Cement ("Ferro Cement") World Opinion" by R. Balasubramanyan; "Western Coastal Shrimp Fishing Industry in the Doldrums" by M. Krishna Raj; "Skirmishes of Fishing Grounds" by S. Dutt; "Theory and Practice of Tagging With Reference to Commercially Important Fishes of India" by K. M. Kewalramani; "'Convenience' Foods From Fish" by T. K. Govindan; "Utilization of Miscellaneous Fish in India" by D. P. Sen and C. S. Bhandary; and "Marine Fisheries in India" by H. K. Prasad.

SW

2.3 APPARATUS FOR CONVEYING FISH

Veb Volkswerft Stralsund (W. Gnoth and R. Menzel) (pat.) (German Democratic Republic)
British Patent 1,274,982
BEMIRA Abstracts 25, No. 7, Abstract No. 2734, 548 (July 1972)

A conveyor for transporting fresh fish in an orderly manner to and from cutting and cleaning devices arranged along the conveyor is described. Reprinted

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2.00 DIMETHYL SULFIDE AS AN ODOR COMPONENT IN NOVA SCOTIA FALL MACKEREL

Ackman, R. G., and J. Hingley (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada), and K. T. MacKay (Fisheries Research Board of Canada, Marine Ecology Laboratory, Bedford Institute, Dartmouth, Nova Scotia, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 7, 1085-1088 (July 1972)

Mackerel taken in the fall of 1971 off Halifax, Nova Scotia, Canada, showed a strong petroleum refinerylike odor. The odor was identified as dimethyl sulfide that originated from the stomach contents of the fish. The odor was specifically associated with the pteropod Spiratella retroversa.

[2 tables, 15 references]

FTP

2.15

DECK HOLDING TANK
(Concept of deck lobster-holding tank using rearranged stocks)

Reprinted in part

[3 figures, 3 references]

2.3 (0.5) UPTAKE OF BACTERIOPHAGE AND THEIR SUBSEQUENT SURVIVAL IN EDIBLE WEST COAST CRABS AFTER PROCESSING

DiGirolamo, R., L. Wiczynski, M. Daley, F. Miranda, and C. Viehweger (Department of Biology, College of Notre Dame, Belmont, CA 94002)
Applied Microbiology 23, No. 6, 1073-1076 (June 1972)

Earlier work has shown that molluscs (oysters, mussels, and clams) and certain crabs can become contaminated with virus by feeding off contaminated shellfish or as a result of living in polluted waters. In the present study, a series of experiments were carried out to determine the major sites of viral residence within crabs and the amount of virus surviving the edible crabs after cooking by boiling in salted water. Dungeness crab (Cancer magister) and "Red Rock" crab (C. antennarius) were used in these tests because they are the principal edible crabs found off the California coast and because they are normally cooked by boiling prior to being eaten. Coliphage T4 was the virus model used in all the experiments. Crabs were held for 48 hr. in aquaria containing sea water purposely contaminated with coliphage T4 (virus count of about 2.6×10^4 plaque-forming units (PFU) per milliliter). Samples of sea water and of crabs were collected and examined after 0,12,24, 48 hr. intervals.

The edible crabs, when held in coliphage T4 contaminated sea water, accumulated high titers of the virus. From 26% to 29% of the virus was found in the crab muscle (the portion of the animal normally eaten). When the contaminated crabs were boiled in salted water (0.5 g. of NaCl per liter), the bacteriophage were inactivated relatively rapidly. Nevertheless, after 10 min. of cooking, 10% of the coliphage survived, and after 20 min. of cooking, 2.5% of the coliphage

(over)

3.15 DEVELOPMENT OF IRRADIATION STERILIZED CODFISH CAKES

Heiligman, F., and Lucy J. Rice (Food Laboratory, U.S. Army Laboratories, Natick, MA 01760)
Journal of Food Science 37, No. 3, 420-422 (May-June 1972)

Earlier, R. O. Sinnhuber, M. K. Landers, T. C. Yu, M. Simon, and F. Heiligman [Food Technol. 22, 1570 (1968)] prepared irradiation sterilized codfish cakes and halibut cakes that were acceptable up to 12 months of storage at 21° C. However, some darkening of the cakes occurred. Subsequent experiments using antioxidant did not result in cakes of any longer keeping quality or of improved flavor. In the present study, experiments were carried out with codfish cakes to confirm the earlier work of Sinnhuber et al. and to extend the work in the development of process criteria for producing a shelf stable, highly acceptable fish product that can be used in mass feeding systems.

The codfish cakes were prepared from frozen codfish fillets. The thawed fillets were ground, and 4 lb. of white corn meal and 1½ lb. of gelatin Viscomix, and ½ lb. salt were added to and mixed with 100 lb. of ground codfish fillets. The mixture was stuffed into regenerated cellulose meat casings. The product was heated in boiling water until a center temperature of 80° to 85° C. was reached (to inactivate the autolytic enzymes) and the heated product was allowed to cool overnight in a 4° C. refrigerator. The casings were removed, and the codfish rolls were cut into 1.25-cm.-thick slices. The samples were then packed in enamel-lined cans under vacuum and in laminated (Mylar/aluminum foil/medium density polyethylene) pouches under vacuum. A porous packet of activated charcoal was added to each can prior to closing it under vacuum. The samples were frozen at

(over)

2.3 (0.38)(2.9) REDUCTION OF ANTITHIAMINE ACTIVITY IN CRAYFISH BY HEAT TREATMENTS

Rutledge, James E., and Levi C. Ying (Department of Food Science, Louisiana State University, Baton Rouge, LA 70803)
Journal of Food Science 37, No. 3, 497-498 (May-June 1972)

Earlier work has shown that different antithiamine factors exist in different species of fish and in the same fish. The authors previously found antithiamine substances in the fresh-water crayfish (Procambarus clarkii). The present article reports on the effects of boiling and drying the crayfish on the antithiamine activity in the organism.

The tail meat and the abdomen of the crayfish did not contain the antithiamine factor; however, the material from the cephalothorax region of the crayfish showed high antithiamine activity (3.70 µg./min./g.).

Boiling the crayfish in water for 30 min. or oven drying them at 100° C. for 24 hr. did not destroy all the antithiamine material in the organisms. The authors were not sure whether the crayfish contained a heat stable antithiamine factor or whether the assay procedure was inadequate. Data on the antithiamine activity in raw and heated crayfish cephalothorax are shown in the table that follows.

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3.2342 IMMERSION FREEZING OF FISH IN DICHLORODIFLUOROMETHANE

Bucholz, Shyrl B., and George M. Pigott (Institute for Food Science and Technology, College of Fisheries, University of Washington, Seattle, WA 98105)
Journal of Food Science 37, No. 3, 416-419 (May-June 1972)

Several dichlorodifluoromethane (DDM) commercial freezers are in use for processing fruits and vegetables. A small freezer for freezing shrimp has been described by F. K. Lawler [Food Eng. 41, 7 (1969)]. DDM has been approved for use on foods [Federal Register, Friday, Sept. 8, 32, 174 (1967)]. DDM has a boiling point of -21.6° C. and shows a heat transfer coefficient of 38.7 B.t.u./hr. ft.^{2} °F.; these characteristics make DDM suitable for freezing food. L. Crawford, B. Finch, and J. Daly (Food Technol. 23, 4 (1969)] indicated that there was some advantage to the use of DDM for freezing tuna. The present study dealt with the freezing of king salmon steaks in DDM and subsequent storage at +5° F.

Samples of king salmon steaks were immersed in DDM (-21.6° F.) until the center of the steak reached +15° F. The steaks were then wrapped in Saran film and placed in frozen (+5° F.) storage. For comparative purposes samples were frozen in an air blast freezer at -30° F. and in a liquid nitrogen-boosted air blast freezer at -70° F. These samples were handled, packaged, and stored similarly to those that had been frozen in DDM. Samples for chemical and taste panel evaluations were taken from storage 1 week after freezing, and each month thereafter for a total of 6 months. The objective tests for quality of the steaks consisted of the 2-thiobarbituric acid (TBA) test for measurement of malonaldehyde and of the peroxide number determination.

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2.3 (0.38)(2.9)

Item	Cephalothorax of crayfish			
	Raw, fresh	Boiled for 5 min.	Boiled for 30 min.	Oven dried at 100° C. for 24 hr.
Amount of thiamine destroyed (μg./min./g.)	3.70±0.32	1.02±0.14	0.89±0.07	0.52±0.05
Specific activity (units/g.)[1]	0.0110	0.0030	0.0027	0.0015
Reduction due to heat treatment (%)	--	72.3	75.8	85.9

[1] By definition, a unit is the micromoles of thiamine destroyed per minute.

[1 table, 14 references] FTP

3.2342

The king salmon steaks frozen by immersion in DDM were comparable in quality to those frozen by regular commercial methods (air blast and liquid nitrogen-fortified air blast). The quality of the salmon steaks was not affected by contact of the fish with DDM. The objective tests indicated that DDM did not alter the tendency of the lipids of the fish toward rancidity. Extraction of data from the two freezing time nomographs presented in the article revealed the following freezing times in liquid DDM: Freezing time in minutes for unpackaged fillets of low-fat, white-fleshed fish was ≅ 2¼ min. for 0.3-in.-thick fillets, ≅ 6¼ min. for 0.6-in.-thick fillets, and ≅ 24 min. for 1.4-in.-thick fillets. Freezing times in minutes for such fillets packaged in heat-shrunk cryovac film was ≅ 3.0 min. for 0.3-in.-thick fillets, ≅ 8¼ min. for 0.6-in.-thick fillets, and ≅ 30 min. for 1.4-in.-thick fillets. The loss in weight after freezing of the salmon fillets was 0.11% for those frozen in DDM, 0.8% for those frozen in liquid nitrogen-boosted air blast, and 1.2% for those frozen in an air blast.

[5 figures, 5 tables, 14 references] FTP

3.15 γ-RADIATION PRESERVATION OF SOME FISH PRODUCTS

Kardashev, A. V., A. T. Karnet, and L. L. Kozlova (U.S.S.R.)
Chemical Abstracts 77, No. 1, 3909d (July 3, 1972)

3.15

-20° C., and some of the frozen samples were used as controls. The samples were irradiated in the frozen state (-30°±10° C.) and were given 3.2 Mrad (12-D dose); a few cans were given 4.5 Mrad. A 1.2 megacurie Cobalt-60 source and a 10 Mev. electron linear accelerator were used to irradiate the samples. After irradiation, samples were stored at 21°, at 38°, and at -29° C. (controls).

Results of these studies and of those conducted by the earlier workers showed that high quality, well accepted irradiated codfish cakes that will remain stable at room temperature (21° C.) for long periods can be produced. The codfish cakes were sterilized by irradiation and were given a dose of 3.2 Mrad at -30°±10° C. The codfish cakes, however, showed a tendency to darken on storage, particularly at elevated temperature (the irradiated fish cakes stored at 38° C. became darker than those stored at 21° C.). The irradiated samples stored at 38° C. were acceptable up to 4 months of storage, but were not acceptable after 9 months. The time of irradiation (gamma vs electron) resulted in no differences in the quality of the product.

[4 tables, 14 references] FTP

3.15 SOME CHEMICAL CHANGES IN IRRADIATED SEAFOODS

King, Frederick J., Joseph M. Mendelsohn, Donald F. Gadbois, and Julius B. Bernsteinas (Atlantic Fishery Products Center, NOAA, U.S. Department of Commerce, Gloucester, MA 01930)
Radiation Research Reviews 3, 399-415 (1972) (Elsevier Publishing Company, Amsterdam, Netherlands)

Although considerable progress has been made in the technology of radiation preservation of seafood, there is still a need for basic chemical information on the effects of irradiating seafoods. This paper discusses the current state of knowledge in the chemistry of irradiated seafoods. The chemical constituents of seafoods are affected by irradiation in several ways. For pasteurizing doses of irradiation, the order of magnitude of the chemical changes in seafoods is similar to that due to the effects of storage or cooking of nonirradiated seafoods.

[1 figure, 3 tables, 75 references] FTP

2.3 (0.5)

survived. Although the internal temperature of the crabs was high enough to inactivate the virus, the processing time used to cook the crabs (total of 20 min.) was not long enough to inactivate all the virus. The authors conclude that crabs processed by boiling in salted water for up to 20 min. could serve as vectors for the dissemination of virus diseases if the crabs are harvested from a polluted area.

[2 figures, 1 table, 12 references] FTP

0.38 FLAGELLAR ATPASE FROM SEA URCHIN SPERMATOZOA. I. PURIFICATION AND SOME PROPERTIES OF THE ENZYME

Ogawa, Kazuo, and Hideo Mohri (Dep. Biol., Tokyo Metrop. Univ., Tokyo, Japan)
Chemical Abstracts 76, No. 17, 96162x (Apr. 24, 1972)

3.2493 PHOSPHOLIPID CHANGES IN MUSCLE FROM FROZEN STORED LAKE MICHIGAN COHO SALMON

Braddock, R. J., and L. R. Dugan, Jr. (Department of Food Science & Human Nutrition, Michigan State University, East Lansing, MI 48823)
Journal of Food Science 37, No. 3, 426-429 (May-June 1972)

Increases in free fatty acid (FFA) content of fish muscle during frozen storage are primarily due to the hydrolysis of phospholipids catalyzed by phospholipases. Earlier work has shown that this increase in FFA resulted from the hydrolysis of phosphatidylcholine (PC), of phosphatidylethanolamine (PE), and to some extent of triglycerides. It is possible that the increased FFA levels could cause denaturation of the protein of the muscle. Decreases have been found in the PC and PE levels of chicken muscle stored at -10° C., with increases in lysophosphatidylcholine (LPC) and FFA. The various results suggest that lipid hydrolysis and protein denaturation were interdependent phenomena. In the present study, the authors examined changes in the phospholipid fraction of stored, frozen salmon muscle and attempted to relate the changes to specific hydrolysis of these lipids by lipolytic enzymes in the tissue.

Lake Michigan coho salmon were frozen and stored at -20° C. The various analyses were made on muscle samples of the fresh frozen fish and of the frozen fish stored for 6 and for 12 months. Analyses were made for the various fatty acids in the triglycerides; the total phospholipids; the phospholipid content of the fresh frozen and the frozen stored salmon; and the fatty acids in the various phospholipids of the frozen stored salmon.

The triglycerides and the phospholipids contained the same spectrum of fatty acids. The phospholipids contained slightly greater levels of $C_{16:0}$, $C_{18:0}$, and $C_{18:1}$ and lesser levels of $C_{16:1}$, $C_{20:1}$, $C_{18:2}$, and $C_{20:5}$ fatty acids than did the

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3.331 (2.3) EFFECT OF PRE- AND POST-MORTEM HANDLING ON REFLECTANCE CHARACTERISTICS OF CANNED SKIPJACK TUNA

Little, A. C. (Department of Nutritional Sciences, University of California, Berkeley, CA 94720)
Journal of Food Science 37, No. 3, 502 (May-June 1972)

This work is a continuation of a study of the effects of controlled pre- and postmortem handling of skipjack tuna on the quality of the canned product. It involved measurement of the reflectance characteristics of canned samples from fish subjected to 34 combinations of controlled handling conditions. In earlier reports, the author indicated (1) that CIE-Y values correlated directly with visual color scores and (2) that the magnitude of the chromaticity shift (Δx, Δy) on reduction with sodium dithionite was a measure of the relative concentration of denatured globin hemochrome.

Results of data on Y values alone revealed that none of the handling practices prior to canning [see L. Crawford, E. F. Irwin, J. Spinelli, and W. D. Brown, J. Food Sci. 35, 849 (1970)] was sufficiently severe to affect systematically and significantly the reflectance values of the canned tuna. Differences, then, are probably due to individual variation.

Data on the magnitude of chromaticity shift (Δx, Δy) on reduction with sodium dithionite showed a systematic decrease in magnitude of chromaticity shift, particularly in Δx, on increasing holding temperature and finally on increasing time at the highest temperature to which the fish were subjected. The following table shows the mean values for Y, Δx, and Δy for all fish subjected to the same postmortem holding conditions.

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3.2493 CHANGES IN THE FLESH LIPIDS OF FISH DURING FROZEN STORAGE. PART II. FLESH LIPIDS OF SEVERAL SPECIES OF FISH

Takama, Kōzō, Kōichi Zama, and Hisanao Igarashi
Bulletin of the Faculty of Fisheries, Hokkaido University 22, No. 4, 290-300 (Feb. 1972) (In Japanese; figures, tables, and abstract in English)

The minced flesh of five species of fish (Alaska pollock, flying squid, northern blenny, yellowtail, and mackerel) was stored at -20° C. for 100 to 120 days; samples were withdrawn from storage at periodic intervals for analysis. Analyses were made for total lipids, phospholipids, neutral lipids, and free fatty acids. The rates of production of free fatty acid in the minced fish were about as follows: Alaska pollock, 12.0 μM/day/100 g. up to 40 days of storage, then it rose to a level of about 450 μM/100 g. of minced fish; mackerel, 8.0 μM/day/100 g.; yellowtail, 3.1; northern blenny, 2.0; and flying squid, 2.0. Lipid degradation was attributed to hydrolysis and oxidative reactions.
[3 figures, 3 tables, 12 references] FTP

4.20 (6.137) TWO-STEP HOMOGENEOUS CONJUGATION AND HYDROGENATION OF METHYL ESTERS OF UNSATURATED FATTY ACIDS

Ben-et, G., A. Dolev, M. Schimmel, and R. Stern (Centre for Industrial Research, The National Council for Research and Development, Ltd., Food Institute, Haifa, Israel)
Journal of the American Oil Chemists' Society 49, No. 4, 205-207 (April 1972)

In an overall study, the authors propose to conjugate linolenic acid selectively without conjugating linoleic acid, and then to hydrogenate the conjugated acid selectively under mild conditions. The keeping quality of various oils seems to be associated with their linolenic acid content. The linoleic acid content of certain oils may be desirable nutritionally because it is an essential fatty acid. Therefore, it would be desirable to selectively eliminate linolenic acid from certain food oils (soybean). The present paper reports on the conjugation of linoleate-linolenate methyl esters by potassium t-butoxide and the hydrogenation of methyl esters of conjugated fatty acids by phenanthrene chromium tricarbonyl complexes. The activity and selectivity of t-butoxide were tested at various concentrations, at different molar ratios of catalyst to oil, and in various solvents. The activity of phenanthrene chromium tricarbonyl was tested at various concentrations, at various temperatures, and in various solvents. The study indicated that a two-step (conjugation/hydrogenation) approach to selective reduction of unsaturated oils might be effective. Further work is being carried out in the search for more active and selective conjugation and hydrogenation catalysts.
[1 figure, 3 tables, 8 references] FTP

3.2493 EFFECT OF LONG-TERM PRESERVATION ON BALTIC SEA COD MUSCLE LIPIDS

Vorob'eva, T. M., and E. Yu. Sukhanova (U.S.S.R.)
Chemical Abstracts 76, No. 25, 152159r (June 19, 1972)

3.6 FREEZE-DRIED PRODUCTS

FMC Corp. (pat.)
British Patent 1,273,298
Refrigeration and Air Conditioning 75, No. 891, 89 (June 1972)

The freeze-dried particles are placed in a chamber which is then evacuated. An inert gas is introduced into the chamber, and an edible coating is sprayed onto the product to cover and seal the particles together with gas filled voids. SW

3.63 FISH DEHYDRATION

[Patentee was not indicated]
Japanese Patent 2533/72
Food Technology 26, No. 6, 76 (June 1972)

Pieces of fish are steeped in aqueous ammonia containing hydrogen peroxide in order to separate the fibers, and then the material is air dried. FTP

4.22 (6.137) HETEROGENEOUS HYDROGENATION OF FISH OILS: KINETIC DETERMINATION OF CATALYST POISONING

Mørk, P. C. (Department of Industrial Chemistry, Norwegian Institute of Technology, University of Trondheim, Trondheim N-7034, Norway)
Journal of the American Oil Chemists' Society 49, No. 7, 426-432 (July 1972)

Results of work on the effect of operating variables on hydrogenation rate, mechanism, and selectivity for vegetable oils have been published but no such information is available for fish oils. In the course of work on the effect of experimental variables on the rates and products of the hydrogenation of mackerel oil, the authors found that the kinetics of the reaction were influenced strongly by catalyst poisons. This paper reports on the kinetic determination of catalyst poisoning during the hydrogenation of fish oil. Refined and bleached mackerel oil was hydrogenated with Nysel Ni catalyst at 170° C. at atmospheric pressure.

A plot of the differential rates of hydrogenation (iodine value units per min.) as a function of the iodine value showed a strong decrease in the rate during the first few minutes of hydrogenation, followed by a somewhat sharp bend in the rate curves around iodine values of 140. Apparently, severe poisoning of the catalyst takes place. Further tests in which the catalyst was added during the run as well as with prehydrogenation of the oil to various iodine values revealed three kinetically distinguishable poisoning effects. The first effect was a rapid one probably due to the presence of sulfur compounds. The second strong primary poisoning was completed within the first few minutes after hydrogenation. Finally, the third comparatively secondary poisoning reached a state of equilibrium after 25-30 min. of hydrogenation. Capelin oil showed similar results to mackerel oil. Also, the same poisoning effects were obtained with other catalysts (Girdler G-70B, Germania P, and formiate catalyst KE/FR II). No poisoning effects were found when using soybean oil. [7 figures, 1 table, 18 references] FTP

3.2493

triglycerides. After the salmon were stored for 1 yr. at -20° C., the difference between the fatty acid levels in the triglycerides and the phospholipids was greater; there were lesser amounts of $C_{14:0}$, $C_{16:0}$, $C_{18:1}$, $C_{18:2}$, and $C_{18:3\omega3}$ and greater levels of $C_{12:0}$, $C_{20:3}$, $C_{20:4}$, $C_{20:5}$, $C_{22:4\omega3}$, $C_{22:5\omega3}$, and $C_{22:6}$ in the remaining phospholipid fraction. The $C_{20:4\omega3}$, $C_{20:5}$, $C_{22:5}$, and $C_{22:6}$ fatty acids are more concentrated in the phospholipids remaining after 1 yr. of storage of the fish at -20° C., while the $C_{16:0}$ and $C_{18:1}$ fatty acids are less concentrated. These changes are due to losses of specific fatty acids from the phospholipid fractions through enzymatic hydrolysis, or oxidative reactions, or both.

There was a decrease in the total phospholipid content in the frozen salmon stored for 6 months at -20° C.; significant decreases occurred in PC and LPC content. There were increases in the LPE (lysophosphatidylethanolamine) fraction and an unidentified phosphorus-containing fraction. These changes were caused by hydrolysis and oxidative reactions. Also, the increased amount of LPE might be due to the release of specific fatty acids (during hydrolysis) that may inhibit enzymatic activity resulting in incomplete hydrolysis and buildup of the LPE.

The data implied a preferential hydrolysis of PE containing $C_{16:0}$, $C_{18:1}$, and $C_{22:6}$ fatty acids. The $C_{16:0}$ and $C_{22:6}$ acids were greatly concentrated and the $C_{18:1}$ acid was much less concentrated in the remaining LPE; this fact is evidence for a slower rate of hydrolysis of PE molecules containing $C_{16:0}$ acids.

It appears that the $C_{16:0}$ and $C_{22:6}$ fatty acids at the ß-position of the PE from the Lake Michigan coho salmon play a role in the preferential hydrolysis by phospholipases of this phospholipid during frozen storage.

This study showed that chemical changes detrimental to the original characteristics are occurring in the complex system of frozen salmon. The enzymatic and oxidative reactions that help cause these changes and their control in food systems are being studied further by the authors. [3 tables, 25 references] FTP

3.331 (2.3)

Effect of holding temperature and time of skipjack tuna on Y value and chromaticity shift of the canned samples

Holding temperature and time of skipjack tuna	Reflectance values for the canned product		
	Y	Δ x	Δ y
Controls	26.7	5.0	-9.4
32° F. for 6 hr.	29.2	4.9	-8.3
60° F. for 6 hr.	27.6	3.6	-10.6
78° F. for 6 hr.	28.0	2.4	-9.5
78° F. for 9 hr.	27.2	1.2	-8.7

The x-chromaticity coordinate is a measure of "red" reflectance. A decrease in the Δ x value, then, probably signifies a decrease in the formation of the bright red ferro-hemochrome. The author suggests that postmortem denaturation of myoglobin inhibits conversion to hemochrome (the pigment responsible for the typical color of canned tuna).
[1 table, 5 references] FTP

3.33 (2.3) USE OF CAUSTIC SODA TO TREAT MACKEREL, HORSE MACKEREL, AND SARDINE BEFORE CANNING

López-Benito, Manuel (Inst. Invest. Pesq., Vigo, Spain)
Chemical Abstracts 76, No. 25, 152223g (June 19, 1972)

5.1 (0.7) A CONSPECTUS OF RESEARCH ON VITAMIN A REQUIREMENTS OF MAN

Rodriguez, Mildred S., and M. Isabel Irwin (Human Nutrition Research Division, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, MD 20705)
Journal of Nutrition 102, No. 7, 909-968 (July 1972)

This conspectus shows what research has been done with human subjects on the dietary vitamin A requirements, how it was done, and what has been learned. Such information will help to point to where further research is needed in order to complete our knowledge of the human needs for vitamin A. The contents consist of the following sections: Introduction; Units and standards of measure; Requirements of adults; Requirements of children; Requirements of pregnant and lactating women; Requirements of the elderly; Factors affecting dietary vitamin A requirements; Comments; Acknowledgement; and Literature cited.
[2 tables, 547 references] FTP

6.137 SEPARATING FATTY ACID MIXTURES IN COMPONENTS OF DIFFERENT MELTING POINTS

Hartmann, Helmut, and Werner Stein; Henkel und Cie. G.m.b.H. (pat.)
German Offen. (Patent) 1,965,644 (July 8, 1971)
Chemical Abstracts 76, No. 15, 85398e (Apr. 10, 1972)

6.137 TRACE METAL CONTENTS, CHEMICAL PROPERTIES AND OXIDATIVE STABILITY OF CAPELIN AND HERRING OILS PRODUCED IN NORWEGIAN PLANTS

Notevarp, O., and M. H. Chahine (Department of Industrial Chemistry, The Norwegian Institute of Technology, University of Trondheim, Norway)
Journal of the American Oil Chemists' Society 49, No. 4, 274-277 (Apr. 1972)

The iron and copper contents of capelin oil and herring oil were determined and correlated with certain physical and chemical properties of the oils. Also, the trace metal contents (iron, copper, and nickel) were determined by atomic absorption spectrophotometry in samples from various industrial processing steps used for production of edible hydrogenated herring oil. Fourteen crude capelin oils, two herring oils, and one blended oil product produced in oil meal plants in northern Norway were examined. Properties of the oil tested were oxidative stability value, peroxide value, benzidine value, iodine value, free fatty acid content, and tocopherol content.

The oxidative stability of the oils was more dependent on the tocopherol content and benzidine value of the crude oils than on their content of trace metals. The iron and copper content of crude capelin oils shows little, if any, correlation with the stability of the oils.

Changes in iron, copper, and nickel contents were determined in marine oils and products after the marine oils were refined and hydrogenated. The contents of these trace metals in the oils and hydrogenated products decreased after alkali refining and bleaching to the lower limits of detectability (by the method of assay used) to 0.01 p.p.m. for iron, 0.02 p.p.m. for copper, and <0.3 p.p.m. for nickel. [2 figures, 3 tables, 11 references] FTP

6.51 (9.16)(9.14) RATE OF GASTRIC EVACUATION IN RAINBOW TROUT FED THREE PELLETED DIETS

Windell, J. T., J. D. Hubbard, and D. L. Horak (Fish Physiology Laboratory, Biology Department, University of Colorado, Boulder, CO 80302)
Progressive Fish-Culturist 34, No. 3, 156-159 (July 1972)

Efficient production and growth of rainbow trout (Salmo gairdneri) depends on feeding the best possible diets at levels not in excess of the dietary needs. It is generally assumed that commercially prepared dry pellet feeds are adequate for all nutritional purposes, yet the present knowledge of the role lipids play in the diet is quite limited. The growing importance of lipids in trout rations and the actual amount of W-3 fatty acids (linolenic acid series) should be considered when evaluating a formula.

In practice, the amount of lipid which can be incorporated in dry pelleted feed approaches an upper limit of 8 to 9 percent of the dry weight due to mechanical characteristics of the pelleting process. Lipid concentrations of 12 to 15 percent can be attained by externally spraying additional lipid on the finished pellet. Inasmuch as (100 percent) lipid concentrations in the diet inhibit or delay gastric evacuation, it was decided to investigate the effect of lesser percentages of dietary lipid on gastric evacuation of pelleted meals. The purpose of this study was to determine if a relation existed between lipid concentrations usually encountered in pelleted feed and the rate of gastric evacuation in rainbow trout. None was found.

Data from the present experiments may provide rationale for fish cultural practices. Appetite appears to be related to stomach evacuation, and hatchery

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6.54 EFFECT OF HYDROGEN PEROXIDE ON THE COLOR, COMPOSITION AND NUTRITIVE QUALITY OF FPC (FISH PROTEIN CONCENTRATE)

Rasekh, J., B. R. Stillings, and V. Sidwell (College Park Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, U.S. Department of Commerce, College Park, MD 20740)
Journal of Food Science 37, No. 3, 423-425 (May-June 1972)

The color of FPC varies from light gray to pale yellow depending upon the species of fish used, the method of producing the FPC, and the particle size of the FPC. FPC seems to darken when it comes in contact with water and with oil. The color of FPC comes from the melanins present in the scales and from the red pigment of the blood (hemoglobin) in combination with the protein. Most of the blood pigment is removed during the manufacture of FPC, but the melanin from the scales remains in the product. Certain oxidizing agents are used to pasteurize or to improve the color of foods. For example, hydrogen peroxide has been used in milk and cheese. The purpose of the present study was to determine if the color of FPC could be improved without loss in quality of the product by treatment of the FPC in an aqueous mixture with small amounts of hydrogen peroxide, followed by spray drying the mixture.

The FPC was prepared from Atlantic menhaden by countercurrent extraction with isopropyl alcohol. The FPC was suspended in distilled water (at 50±2° C.) and hydrogen peroxide was added to the desired level. Five levels of hydrogen peroxide were tested: 0.30, 0.60, 1.25, 2.5, and 5.0%. The sample without added hydrogen peroxide was used as the control. After the slurry was allowed to bleach for a total of 20 min. at 50±2° C., it was spray dried at 60 lb./in.^{2} pressure in

 (over)

6.32 [STUDY OF THE FREE AMINO ACIDS AND THE PROTEINS OF SOME MARINE ALGAE]
ESTUDIO DE LOS AMINOACIDOS LIBRES Y DE LAS PROTEINAS DE ALGUNAS ALGAS MARINAS

Quilhot, Wanda P. (Department of Biology, University of Chile, Valparaíso, Chile)
Revista de Biología Marina 14, No. 2, 55-61 (Nov. 1970) (In Spanish; summary in English) (Department of Oceanology, University of Chile, Valparaíso, Chile)

Data are given on the amino-acid and protein composition of the algae Ulva lactuca L., U. linza L., and Durvillaea antarctica (Cham.) Hariot, Lessonia nigrescens Bory, and Porphyra columbina Mont. The amino-acid and protein composition among these species of algae did not differ greatly. The low content of these amino acids (3.6 to 12% of the dry weight) seems to limit the value of these algae as a basic food.
[3 tables, 9 references] FTP

Current research into the production of protein from Spirulina, Scenedesmus and Fusarium is described. L.P.

Reprinted

6.37 PROTEINS FROM MICROALGAE AND MICROFUNGI
(6.54)(0.6)

Anonymous
PAG Bull. [FAO/WHO/UNICEF, United Nations, New York, N.Y.], 2, No. 1, 19-22 (1971)
BPMIRA Abstracts 25, No. 5, Abstract No. 1675, 340 (May 1972)

4.5 AUTOXIDATION OF SODIUM LINOLEATE IN THE PROTEIN SOLUTION

Yukami, Susumu (Research Laboratory, The Lion Dentifrice Co., Ltd.)
Agricultural and Biological Chemistry 36, No. 5, 871-874 (May 1972)

Various compounds accelerate or inhibit the autoxidation of lipids. For example, casein promoted the uptake of oxygen by linoleic acid and bovine serum albumin (BSA) showed an inhibitory effect. Lysine, histidine, and arginine exhibit strong catalytic effects on lipid autoxidation. The mechanism of these effects are not yet clear. In the present experiments, the effects of protein concentration on lipid autoxidation were determined. BSA was used as the protein and linoleate as the lipid. The effects of BSA were compared with those of ovalbumin and gamma-globulin. Appropriate quantities of the purified BSA and pure linoleic acid in buffer solution at pH 9.0 were placed in Warburg apparatus and the oxygen uptake was measured. The mixture was allowed to autoxidize and, in other tests, was enzymatically oxidized by the addition of soybean lipoxidase.

In the autoxidation of linoleate in protein (BSA) solution, the oxygen uptake varied with the concentration of the protein in the mixture. At protein levels of 0.05% and 0.17%, oxygen uptake was greatly reduced; at the protein level of about 0.5%, oxygen uptake was greatly increased; and at protein levels of 1% and greater, oxygen uptake increased, but the increase was progressively less as the protein level increased above 1% (the protein levels tested were 0.05, 0.17, 0.35, 0.58, 0.86, 1.73, 2.59, and 3.45%). Oxygen uptake of linoleate in the presence of enzyme (soybean lipoxidase) was similarly influenced by the level of protein in the mixture. On the basis of observations of the energy of activation rates for BSA and ovalbumin or gamma-globulin, the author believes that the catalytic action of BSA is similar to autocatalysis rather than to enzyme biocatalysis.
[6 figures, 2 tables, 15 references] FTP

6.54

a laboratory spray drier. The temperature at the inlet was 280±5° F. (138±3° C.) and the outlet, 190±5° F. (88±3° C.).

The color of the samples was examined with a color meter. Sensory tests (appearance, texture, and flavor) were made of cookies prepared from the test samples. The samples were analyzed for total amino acids, and for their nutritive values by rat-feeding studies.

The color of FPC and of products (paste and cookies) prepared from FPC can be improved by treating the FPC with hydrogen peroxide. The optimum level of hydrogen peroxide was 0.6%; at this level there was no decrease in the nutritive quality of the product. Higher levels of hydrogen peroxide (1.25, 2.5, and 5.0%) resulted in further improved color of the FPC but the nutritive quality was reduced slightly. The reduction in quality of the FPC treated with higher levels of hydrogen peroxide may have been due to destruction of some methionine and cystine.
[4 tables, 18 references] FTP

McPhee, Archie D., David L. Dubrow, and Lloyd O. Henderson (College Park Fish Prod. Technol. Lab., Natl. Mar. Fish. Serv., College Park, Md.)
Chemical Abstracts 76, No. 23, 139219r (June 5, 1972)

6.54 TERNARY EQUILIBRIUM DATA FOR PRODUCTION OF FISH PROTEIN CONCENTRATE (FPC)

6.51 (9.16)(9.14)

feeding frequency can be scheduled according to the rate at which the stomach content is depleted, i.e., the amount of available stomach capacity. Although little data are available there is good reason to believe that lipid concentrations in excess of 15 percent of the dry weight do have an inhibitory effect on gastric motility.

The range of lipid concentrations normally found in commercially prepared dry pelleted feed is not an important factor when considering rates of passage through the alimentary canal. Since lipid concentrations which can be incorporated in dry pelleted feed are limited by the mechanics of the pelleting process, nutritionists and manufacturers need add only that amount necessary for adequate growth. [1 figure, 2 tables, 6 refererences] Extracted

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Velarde, E. (Lab. Quím., Fontif. Univ. Catol. Peru, Lima, Peru)
Chemical Abstracts 76, No. 25, 152249v (June 19, 1972)

6.54 DETERMINATION OF THE NUTRITIVE VALUE OF THE PROTEIN OF FISH FLOUR

7.599 A PRECISE METHOD FOR THE DETERMINATION OF DIMETHYL SULFIDE IN PROCESSED FOODS

Williams, Marion P., Johan E. Hoff, and Philip E. Nelson (Department of Horticulture, Purdue University, Lafayette, IN 47907)
Journal of Food Science 37, No. 3, 408-410 (May-June 1972)

Dimethyl sulfide (DMS) is a degradation product of an S-methyl-methionine sulfonium salt. It appears in and contributes to the flavor and aroma of certain foods. Because DMS has a very low flavor threshold value (around 0.33 to 12 p.p.b. in water), it may be that the level of DMS in foods can be important in consumer acceptance. For example, earlier work has shown that a DMS level of from 0.5 to 2 p.p.m. in tomato juice produces the most desirable aroma quality.

The optimum level of DMS in food products can be achieved by selecting the proper processing conditions or by appropriate blending of raw material or finished product. To perform this kind of product quality control requires the availability of a rapid, accurate method for determining DMS. Present methods do not offer the required speed and precision. The authors, therefore, developed a suitable quality control method by adapting and modifying the procedure described by C. McAullife ["GC determination of solutes by multiple base equilibration," Chem. Technol. 1, 46 (1971)] for the determination of low levels of hydrocarbons in aqueous solutions. Twenty-five ml. of product liquid and helium gas are equilibrated in a 50-ml. hypodermic syringe. The gaseous phase is analyzed for DMS by gas chromatography. The system in the syringe adheres to Henry's law (there exists a proportionality between the concentrations of DMS in the gas phase and in the liquid phase) and Henry's constant is essentially identical for all processed food samples. When five replicate samples from each of three processed foods containing

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8.42 (6.51) MINERAL COMPOSITION OF OREGON PELLET PRODUCTION FORMULATIONS

Crawford, David L., and Duncan K. Law (Department of Food Science and Technology, Seafoods Laboratory, Oregon State University, Astoria, OR 97103)
Progressive Fish-Culturist 34, No. 3, 126-130 (July 1972)

Oregon pellets have been used for feeding salmon on a production scale basis since 1959. Use of this formulation is supported by over 10 years of research by the Oregon Fish Commission and Oregon State University. As a production formulation in wide use it has yielded good results with salmon raised under a variety of conditions including temperature extremes. The purpose of this investigation was to develop quantitative information on the mineral composition of Oregon pellet formulations and to evaluate the effect of formulation composition variations.

Four tables are presented: the first gives the composition of two Oregon pellet formulations (see the table that follows); the second gives the mean proximate composition of the two Oregon pellet production formulations; the third gives the mean mineral composition of the two Oregon pellet production formulations containing different wet fish components; and the fourth gives the mean mineral composition of the two Oregon pellet formulations.

(over)

7.8 CHROMATOGRAPHIC ANALYSES OF VOLATILE AMINES IN MARINE FISH

Gruger, Edward H., Jr. (Northwest Fisheries Center, National Marine Fisheries Service, NOAA, 2725 Montlake Blvd. East, Seattle, WA 98102)
Journal of Agricultural and Food Chemistry 20, No. 4, 781-785 (July-Aug. 1972)

Amines in fish arise from bacterial action, enzymic reactions, and nonenzymic chemical reactions; the content of amines in fish varies with the species and age of the fish, and the handling and storage conditions. The level and variety of amines in fish (and other food products) is important relative to nitrite-treated products because of the reported involvement of the amines as potential precursors of carcinogenic nitrosamines. This article reports on the development of procedures for analysis of volatile amines in fish.

The amines were extracted from the flesh of sablefish, coho salmon, and salmon roe. The mixture of amines were analyzed by gas chromatography and by thin-layer chromatography-spectrophotofluorometry of the corresponding 5-dimethylamino-1-naphthalenesulfonamides.

The data, though limited, indicate that the amine patterns of the fish and salmon roe tested were relatively uncomplicated. The methylamines and diethylamine were the only ones that were confirmed for samples at levels above the level of detection of 7 ng./g. of wet tissue.

Salmon flesh showed from < 0.007 to 1.4 µg. of methylamine per gram of tissue, from 1.1 to 6.6 µg. dimethylamine per gram of tissue, from < 0.007 to 0.24 µg. diethylamine per gram of tissue, and from 3.6 to 6.6 µg. of trimethylamine per gram of tissue.

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8.53 (0.35) ISOVALERIC ACID IN ACOUSTIC TISSUES OF PORPOISES: TRIACYLGLYCEROLS RESISTANT TO PORCINE PANCREATIC LIPASE

Malins, Donald C., and Usha Varanasi (National Marine Fisheries Service, NOAA, Northwest Fisheries Center, 2725 Montlake Blvd. East, Seattle, WA 98102)
Protides of the Biological Fluids. Published by Pergamon Press, Oxford and New York (n.d.), pp. 127-129. H. Peeters (Editor) (This note is Contribution No. 77 of the Oceanic Institute, Oahu, Hawaii)

Large amounts of isovaleric acid (a catabolite of L-leucine) and high levels of long-chain iso structures are found in the melon and mandibular canal (acoustic tissues) of porpoises. The blubber tissue (which has no acoustic function) contains much lower amounts of isovaleric acid and long chain iso acids. This study reports on an examination of the composition of the melon (acoustic) tissue of the porpoise (Tursiops gilli). The melon triacylglycerols were hydrolyzed by porcine pancreatic lipase and the reaction products were chromatographed on thin layers of silica gel at 2° C. in hexane:diethyl ether (80:20, v/v).

The melon triacylglycerols were strongly resistant to lipase hydrolysis (60.7 wt. % of the melon triacylglycerols were resistant to porcine pancreatic lipase). This resistance to lipase hydrolysis appears to be related to the presence of branched chains in the triacylglycerols; branched structures would sterically hinder the formation of the activated complex between the enzyme and the ester linkage. Data are given in the table.

(over)

7.8

The sablefish showed no dimethylamine and < 1 μg. of diethylamine per gram of wet tissue. A sample of the sablefish stored in aluminum foil at 6 ± 1° C. for 28 days, showed eightfold as much trimethylamine and one-seventh as much methylamine as did the good unstored flesh. The stored sablefish, also, showed no dimethylamine.

Salmon roe showed 0.58 to 1.2 μg./g. of wet tissue of methylamine, 3.1 to 4.1 μg./g., of dimethylamine, 5.7 to 7.9 μg./g. of trimethylamine.

[5 tables, 28 references] FTP

7.42 DETERMINATION OF MERCURY IN FOODS, INDUSTRIAL EFFLUENTS AND DRINKING WATER BY MEANS OF FLAMELESS ATOMIC ABSORPTION SPECTROPHOTOMETRY (9,19)

Cavalliaro, A., and G. Ellis
Boll. Lab. Chim. Prov. 22, No. 2, 168-179 (1971) (In Italian)
BFMIRA Abstracts 25, No. 6, Abstract No. 1962, 397 (June 1972)

A procedure is described by which down to 0.01 p.p.m. of mercury in foods and 0.005 p.p.m. in drinking water and effluents can be determined. C. C. Reprinted

7.599

mean DMS levels of 3.0, 6.1, and 15.1 p.p.m. were analyzed, the standard errors were ±0.10, ±0.24, and ±0.29 p.p.m., respectively. The DMS content in parts per million of certain processed (canned) foods is as follows (each value represents analysis of one can): vegetable juice, 1.6, 2.1, 2.2; kraut juice, 2.4, 3.2, 3.8; peas, 4.9, 5.0, 5.1; tomato juice, 5.9, 6.4, 7.4, 10.2; yellow corn, 10.1, 11.6, 12.2, 16.0; and beets, 14.1, 27.9, 43.6.

[1 figure, 2 tables, 12 references] FTP

7.59 A STUDY OF THE METHODOLOGY FOR ASSAYING UNIDENTIFIED GROWTH FACTOR IN FISH MEAL AND FISH SOLUBLES

Miller, David, and Joseph H. Soares, Jr. (College Park Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, U.S. Department of Commerce, College Park, MD 20740)
Poultry Science 51, No. 4, 1288-1291 (July 1972)

Four experiments were carried out, using a crystalline amino acid diet, to develop an improved bioassay for evaluating the unidentified growth factor(s) (UGF) in fishery products. Dietary adjustments were made to equalize the content of selenium (Se), fish oil, and of each amino acid based on the chemical analyses of the test materials. The existence of the UGF was demonstrated in the presence of an intact protein (5% gelatin), and constant total levels of proline (0.82%), Se (0.5 p.p.m.), and fish oil (1%). The UGF response from fishery products appears to be independent of the intestinal flora of the chicks and is derived from an unknown nutrient in the fishery products.

[6 tables, 6 references] FTP

8.53 (0.35)

Acid	Porpoise melon triacylglycerols	Lipase resistant fraction of the triacylglycerols
	mole %	mole %
5:0 (iso)	50.5	64.9
7:0	1.0	<0.5
9:0	<0.5	<0.5
11:0 (iso)	0.7	<0.5
11:0	<0.5	<0.5
12:0 (iso)	<0.5	<0.5
12:0	<0.5	<0.5
13:0 (iso)	1.5	1.0
13:0	<0.5	<0.5
14:0 (iso)	3.1	2.7
14:0	4.1	3.3
14:1	1.9	<0.5
15:0 (iso)	13.0	14.3
15:0	1.0	<0.5
16:0 (iso)	2.3	1.9
16:0	3.9	2.5
16:1	6.7	4.6
17:0	<0.5	--
17:1	<0.5	--
18:0	<0.5	<0.5
18:1	4.0	2.0
Unknown	3.0	1.0

[1 figure, 2 tables, 8 references] FTP

8.42 (6.51)

Composition of Oregon pellet formulations for feeding salmon on a production scale basis

Component	Amount used in formulation:	
	OPR-1	OPR-2
	%	%
Cottonseed meal	22.0	15.0
Herring meal	22.0	28.0
Shrimp (or crab) meal	4.0	4.0
Wheat germ meal	3.0	4.0
Corn distiller's dried solubles	3.0	4.0
Dried whey-products	--	5.0
Vitamin mixture	1.5	1.7
Wet fish	40.0	30.0
Kelp meal	2.0	2.0
Soybean oil-antioxidant	2.0	5.8
Choline chloride	0.5	0.5

[4 tables, 13 references] FTP

8.53 STEROLS OF MOLLUSCS

Idler, D. R., and P. Wiseman (Halifax Lab., Fish. Res. Board Canada, Halifax, Nova Scotia, Canada)
Chemical Abstracts 76, No. 15, 83761s (Apr. 10, 1972)

8.59 CHOLESTEROL CONTENT OF FOODS
(0.7)(0.31)

Feeley, Ruth M., Patricia E. Criner, and Bernice K. Watt (Consumer and Food Economics Research Division, Agricultural Research Service, U.S. Department of Agriculture, Hyattsville, Md.)
Journal of the American Dietetic Association 61, No. 2, 134-149 (Aug. 1972)

Studies were performed to update and expand the values of cholesterol content in foods in table 4 of Agriculture Handbook No. 8, Composition of Foods--Raw, Processed, Prepared. Sources that were the basis of values shown in that table were reexamined and modified or replaced by additional information published through 1971, and by new, unpublished research. As a result of this study, values that are considered the most suitable for estimating cholesterol in foods were compiled in a table to aid in calculating diets.

Principal sources of cholesterol in the American diet are meats, poultry, fish, shellfish, eggs, and dairy products. Several items from each of these categories were listed in the table. Data for cholesterol content were provided on three bases: specified household measure; 100-g. edible portion; and edible part from 1 lb. food as described.

Cholesterol is one of the cyclic alcohols called sterols. It is synthesized by the body and functions in normal metabolism. It is also supplied in foods of animal origin only. Cholesterol content of foods has been mistakenly related to fat content; the assumption was that removal of fat would result in a corresponding decrease in cholesterol. A comparison of data in the table shows that lower fat content in related foods is not accompanied by lower cholesterol content.

(over)

9.11 IMPLICATIONS OF A SYSTEMS APPROACH TO OCEANOGRAPHY

Walsh, John J. (Department of Oceanography, University of Washington, Seattle, WA 98105)
Science 176, No. 4038, 969-975 (June 2, 1972)

As far back as 40 years ago, W. C. Allee [Ecol. Monogr. 4, 541 (1934)] suggested the study of total marine ecosystems. Our environmental problems are greater now than they were in 1933, but use of the systems approach to solve these problems has had to await the development of adequate technology, including the interest in such an approach to oceanography. Use of digital computers has made possible complex models of multiple population interaction, fishery management, and nutrient flow within several trophic levels. The author suggests that the ability to simulate has perhaps caught up with the ability to measure total ecosystems.

Because the intertidal regions are easily accessible, it has been well described, and energy budgets have been prepared for mangrove forests, salt marshes, and rocky coasts. The distribution of marine benthic communities and individual pelagic communities has been studied. But, little work has been addressed to studies of total marine ecosystems on a scale comparable to studies of the terrestrial biomes of grassland, tundra, desert, deciduous forest, coniferous forest, and tropical forest. Some effort has been made to develop simulation models as part of a systems approach to upwelling systems [J. J. Walsh, J. C. Kelley, R. C. Dugdale, and B. W. Frost Invest. Pesq. 35, 25 (1971)]. Such studies led to the question of whether or not the ecosystem of these coastal upwelling areas constitute collectively a marine biome.

(over)

9.12 TEMPERATURE TRENDS AND THE DISTRIBUTION OF GROUNDFISH IN CONTINENTAL SHELF WATERS, NOVA SCOTIA TO LONG ISLAND

Colton, John B., Jr. (National Marine Fisheries Service, Northeast Fisheries Center, Woods Hole, MA 02543)
Fishery Bulletin 70, No. 3, 637-657 (July 1972)

The 1953 to 1967 downward trend in seawater temperature in continental shelf waters between Nova Scotia and Long Island did not significantly alter the distribution of four species of groundfish. There was an extension of the southern range of American plaice and a contraction of the northern range of butterfish. These shifts in distribution were not extensive. The equatorward boundary of American plaice appears to be limited by summer temperatures too high for survival and the poleward boundary of butterfish by summer temperatures too low for reproduction. There was no obvious alteration in the geographic distribution of haddock and yellowtail flounder. The distribution and movements of haddock and yellowtail flounder appear to be influenced more by restrictive spawning area and bottom type conditions than by temperature.
[12 figures, 48 references] Author's abstract

9.14 FOOD RESOURCE DIVISION AMONG NORTHERN, MARINE, DEMERSAL FISHES

Tyler, A. V. (Fisheries Research Board of Canada, Biological Station, St. Andrews, New Brunswick, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 7, 997-1003 (July 1972)

Earlier work indicated that fresh-water fishes in communities have overlapping feeding niches when food resources are superabundant but the niches are rather discrete when abundances of food are reduced. The present study examined the food-resource partitioning among marine fish species in an area of Passamaquoddy Bay, New Brunswick, Canada. The division of food resources among 13 species of demersal fishes was studied over a 16-month period. Over 100 prey species were found in the stomachs of the predators; however, each predator took only three or four principal prey. The species taken as principal prey by the predators depended upon the body size of the prey, upon whether the prey were nekton, epi-fauna, or in-fauna, and upon whether the prey had a hard test or shell. Generally, the smaller predators ate the smaller prey. The seasonal predators, as a group, did not feed on their own set of prey species.
[5 figures, 28 references] FTP

Chemical Abstracts 76, No. 25, 152354a (June 19, 1972)
Def. Publ. U.S. Patent Off. 896,037 (Mar. 21, 1972)
Wright, Donald L. (pat.)

9.14 FISH, OYSTER AND CRUSTACEAN FOOD COMPRISING PARTICULAR PROTEINS DERIVED FROM HYDROCARBONS

9.11

The systems approach used in the International Biological Program studies of upwelling ecosystems involves the interaction of environmental data, experimental work, data analyses, and simulation models. The adoption of the systems approach is a new way to view and to do oceanography. Recent studies (field and theoretical) on upwelling systems reveal the need for experimental oceanography based on computers capable of rapid data analysis and on simulation modeling aboard ship and ashore. The computing system aboard ship must be capable of acquiring data in real time, of data editing of underway and batch input, of graphic display of historical data, of presentation of ongoing laboratory experiments aboard ship, and of running simulation models. The systems oceanographer must be able to plan tactical responses to temporal and spatial variations of upwelling ecosystems. This ability to view the ocean on the spot, rather than a year later, is essential to a systems approach.

Most of the environmental problems occur at the systems level of complexity. If models are used as one of the necessary tools of studies of marine ecosystems, and if these models and their individual components are tested in the field, families of systems may eventually be used as models as a guide to an understanding of the dynamics, and to the prediction and management of perturbations of marine coastal areas.

[3 figures, 1 table, 101 references]

FTP

9.15 INCIDENCE OF EPIDERMAL LESIONS IN FISH OF THE NORTH-EAST IRISH SEA AREA, 1971

Perkins, E. J., J. R. S. Gilchrist, and O. J. Abbott (University of Strathclyde, Marine Laboratory, Garelochhead, Dunbartonshire, Scotland)
Nature 238, No. 5359, 101-103 (July 14, 1972)

In March 1971, the authors and the fishermen noted a high incidence of epithelial lesions in plaice (Pleuronectes platessa) and dab (Limanda limanda) taken in the North-East Irish Sea. During the period 1959 through 1970 epithelial lesions in these fish did not occur to a significant degree. The lesions consist of lymphocystis, epidermal ulcers, and fin damage. The symptoms were confined to plaice and dab that were of such size to have spent at least one winter in deep water and then to have entered the fishery in the North-East Irish Sea.

Although epidemics may occur periodically, the situation appeared abnormal because the three diseases occurred simultaneously in some 1,500 square miles of sea. The Irish Sea has been used as a dumping ground for toxic chemicals and has been the scene of a shipwreck in 1969. Some of the materials from these sources--such as the polychlorinated biphenyls--may possibly, in sublethal doses, render the exposed fish more susceptible to the onset and influence of disease. Because the disease was absent in young fish from the fishing area (and nursery grounds), it appears that the event that caused the diseased state occurred while the adult fish were in deeper water during the winter. The evidence is not sufficient, however, to indicate whether the present outbreak of the diseases is of bacterial origin or if the dumping of toxic wastes is responsible. The study is being continued and will be reported later.

[5 figures, 3 tables, 7 references]

FTP

8.59 (0.7)(0.31)

Meats of all kinds contain cholesterol. It is present in lean muscle, cell membrane structures, and fatty tissues; it occurs in higher concentrations in organs and glandular meats than in regular cuts of meat, with or without fat, with highest concentrations in brains. The amount of cholesterol is about the same in marbled and nonmarbled meat.

Egg yolk is one of the most concentrated sources of cholesterol in the diet; egg white has none. Some cholesterol is present in noodles because of the legal requirement for egg solids.

Cholesterol content for poultry, fish, shellfish, and dairy products was also listed. Data are listed for the following fish and shellfish and certain of their prepared products: sturgeon caviar, salmon roe, clams, crab, lobster, oysters, scallops, shrimp, frog legs, cod, flounder, haddock, halibut, herring, mackerel, salmon, sardines, trout, and tuna. In addition, scattered data were reported for bass, carp, perch, pike, pollock, sole, and whiting.

SW

[1 table, 45 references]

9.11 (0.2) PARTIAL PRESSURE OF GASES DISSOLVED AT GREAT DEPTH

Fenn, Wallace O. (Department of Physiology, University of Rochester School of Medicine and Dentistry, Rochester, NY 14620)
Science 176, No. 4038, 1011-1012 (June 2, 1972)

The author applied thermodynamic concepts to data showing that the solubilities of oxygen, carbon dioxide, and helium in water decrease with increasing pressure and depth. The calculations show that when water is saturated with a given gas at 1 atmosphere pressure absolute, the equilibrium partial pressure of the gas at any depth is equal to the partial pressure of that gas if it were contained in a gas column extending from the surface to that particular depth. The values for gases (He, O_2, CO_2) in water calculated for conditions at the surface and at a depth of 10 km. (assuming that both the concentration and partial pressure are affected by depth) are shown in the table that follows.

Gas	Partial pressure of gas		M/partial molal volume	Relative concentration of the gas		Partial pressure of gas in water at a depth of 10 km.
	At the surface of the water	At 10 km. depth of the water		At the surface of the water	At 10 km. depth of the water	
	atm.	atm.	mole/ml.			atm.
Helium	1.0	1.17	4/29.7	1.0	0.35	1.4
Oxygen	1.0	3.55	32/32	1.0	1.0	4.0
Carbon dioxide	1.0	5.7	44/34.8	1.0	1.39	5.7

[2 figures, 1 table, 3 references]

FTP

8.53 POSSIBLE EXPLANATION FOR THE DIFFERENCES IN THE FATTY ACID COMPOSITION OF FRESH-WATER AND MARINE FISHES

Farkas, Tibor (Biol. Res. Inst., Hung. Acad. Sci., Tihany, Hungary)
Chemical Abstracts 76, No. 13, 70366s (Mar. 27, 1972)

9.15 PARASITIC INFESTATION OF SOME MARINE FISHES BEFORE AND AFTER CONFINEMENT IN FEEDING CAGES

Williams, Ernest H., Jr. (Department of Fisheries and Allied Aquaculture, Agricultural Experiment Station, Auburn University, Auburn, AL 36830)
Alabama Marine Resources Bulletin, No. 8, 25-31 (June 1972) (Alabama Marine Resources Laboratory, Dauphin Island, AL 36528)

Under mariculture conditions fish parasites are an important problem. Fish that were captured for an experiment in mariculture techniques were examined for parasites. The fish were held in wire cages at stocking densities of 150 to 450 per cubic yard in a salinity range of 15 to 30 p.p.t. No massive mortalities occurred.

Twenty of each of the following species were studied. Pompano (Trachinotus carolinus Linnaeus), Atlantic croaker (Micropogon undulatus Linnaeus), spot Leiostomus xanthurus Lacepede), gafftopsail catfish (Bagre marinus Mitchill), and sea catfish (Arius felis Linnaeus).

In pompano, the incidence of Trichodina species, monogenetic trematodes and cestodes increased after confinement. Digenetic trematodes, and Scyphidia species and Trichodina spp. infestations on the skin decreased. In Atlantic croaker, the numbers of monogenetic and digenetic trematodes and nematodes decreased during confinement while Trichodina increased. In gafftopsailfish, infestations of Trichodina spp. and Scyphidia spp. increased on the gills after confinement. On the skin, infestations of Trichodina and Vorticella spp. decreased. In sea catfish, numbers of monogenetic trematodes on the gills decreased. On the skin of the catfish, numbers of Trichodina decreased. In spot infestations of monogenetic trematodes, Trichodina, leeches, and encysted nematodes occurred on the gills.

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9.16 (9.14) FROG CULTURE AND RATION DEVELOPMENT

Culley, Dudley D., Jr., and Samuel P. Meyers (Louisiana State University, Baton Rouge, LA 70803)
Feedstuffs 44, No. 31, 26-27 (July 31, 1972)

Several million bullfrogs (Rana pipiens) and leopard frogs (R. catesbeiana) are used annually in the United States for teaching and research purposes. About 50% of these frogs are imported and the other 50% are collected from the wild, with an estimated loss of 80% due to disease and mishandling. Unless a successful method of aquaculture is developed a serious decline in the availability of frogs is predicted within 10 to 15 years.

There is a real need for sound amphibian aquaculture. Frogs can be important in research because of a virus-linked cancer found in them. Other amphibians, because of their capability to regenerate lost organs, are interesting relative to humans regenerating replacement of organs.

Outdoor attempts at frog aquaculture have failed due to disease, cannibalism, predation, and slow growth related to environmental temperature. Indoor culture under controlled conditions has been more successful.

Increased attention to genetics of frogs and development of laboratory defined strains will be necessary if they are to become a reliable research medium. Several companies raise frogs which are standardized for basic characteristics as age, geographic origin, nutrition, and rearing conditions. Aquaculture of frogs is handicapped because the nutritional requirements of tadpoles are not known, and also by the lack of an acceptable pellet-type feed. At 21° to 27° C., frog eggs

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9.16 (1.81) OYSTERS: REATTACHMENT AS A METHOD OF REARING CULTCHLESS HATCHERY OYSTERS

Riley, John G., Richard J. Rowe, and Herbert Hidu (Department of Agricultural Engineering, University of Maine, Orono, ME 04473; and the Ira Darling Center for Research, Teaching and Service, University of Maine, Walpole, ME 04573)
Commercial Fisheries Review 34, Nos. 5-6, 41-43 (May-June 1972)

The most significant development in oyster hatchery economics in recent years has been cultchless setting. Great efficiency is achieved in the juvenile phase by eliminating bulky cultch and oyster mortality due to crowding loss on cultch. However, the rearing of a free juvenile oyster to harvest has presented the industry with new problems. It may not be practical to place small free oysters directly on the bottom because of high loss due to siltation, movement by currents, and bottom-dwelling predators, especially blue crabs in the Chesapeake area. The traying of cultchless oysters to harvest may present economic problems due to the handling necessary to alleviate crowding and to control fouling organisms.

An alternate approach is to rear cultchless oysters under controlled conditions to a size allowing efficient growth in the hatchery (approximately ½") and then reattach the oysters to a substrate for placement in the field to harvest. Such a method would permit the efficiency of the hatchery cultchless operation; at the same time, it would allow optimal spatial distribution of oysters later in the field. This may provide conditions for maximum growth and desirable shell dimensions.

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9.17 (9.3) NATIONAL AND INTERNATIONAL FISHERIES MANAGEMENT POLICY

Clingan, Thomas A., Jr. (University of Miami Sea Grant Decision Seminar, November 1971) (chairman)
University of Miami Sea Grant Special Bulletin No. 5, 35 pp. (Jan. 1972). Available from the Information Services, Sea Grant Institutional Program, University of Miami, Box 9178, Miami, FL 33124. Price $3.00.

A seminar was convened for the purpose of considering the policies that would cover seven problem areas in national and international fisheries management. The report covers goals, identifies trends, analyzes problems, and gives the conclusions of the seminar.

1. Fishery Resources and Their Exploitation: History, Present Trends and Projections.--The world catch of marine fish, in 1968, was 57 million metric tons (125.7 billion lb.). Stocks of flatfish, cods, and Atlantic redfish are exploited close to their potential. Stocks of tuna, sardines, jacks, anchovies, and hakes could be exploited more. Shrimp, salmon, and tuna constitute more than 50% of the total landed value of U.S. fisheries. The future demand in the United States will remain for high-quality, high-priced stocks, canned and frozen fish products, and industrial fish for oil and animal feeds.

2. Goals of Fishery Management and Regulation.--Neither maximum sustainable yield nor maximum economic yield, but a combination of the two plus social factors should establish a new fishery management goal called "Maximum Social Yield."

3. Methods of Regulation.--The first step in regulation is to determine the correct level of fishing that is required to achieve the desired level. The methods to regulate a fishery are control of fishing effort, restricting age and size of fish taken, and reduction of the number of fishing units.

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9.16 (1.81)

Cultchless European oysters, Ostrea edulis, were artificially reattached to asbestos-cement boards. After 4 months' submersion, the oysters showed growth rates and morphology superior to those of nearby tray-grown stocks; they demonstrated natural reattachment to the panels.

More extensive work is now in progress to evaluate the system quantitatively on a long-term basis, to determine the optimum spatial arrangement of the oysters on the panels and of the panels themselves, and to compare growth rate and survival to those of conventional rearing methods.

[1 illustration, 5 references] Reprinted in part

9.17 (9.3)

4. Widths of the Territorial Sea, Fisheries Contiguous Zones and the Proposed Areas of Limited Preferential Fishing Rights Assigned to Coastal States.--Some coastal States claim jurisdiction over territorial seas. Boundary lines should conform to biological criteria. Zones of specific fish stocks should be established by coastal States with preferential right to a sustainable yield (SY), principally affected foreign nations should receive an allocation of the SY.

5. Assistance and Technical Aid in Support of Fisheries Management.--Federal programs support operation and maintenance of vessels. Only operators of U.S. vessels fish in territorial waters and the contiguous zone of the United States and land fish at U.S. ports. Where a U.S. vessel is seized by [agents of] a foreign country, the Secretary of State will attempt to secure release of the vessel and reimburse the owner's fines. (More assistance should be given to improve markets, increase the quality control of fish products, and for incentives to increase safety.)

6. National Organization and the Management and Regulation of Fisheries.--A fishery lying within a State should be managed by that State. A fishery lying within two or more States should be regulated by a commission. A fishery harvested by domestic and foreign fishermen should be regulated by a commission. A fishery now regulated should not be disturbed.

7. International Organization and the Management and Regulation of Fisheries.--In the proposed 1973 Law of the Sea Conference, defense and fisheries interests will be influential. The U.S. fisheries objectives are to protect the coastal fisheries, create effective management schemes, and enhance the U.S. distant water fisheries. The U.S. objectives with respect to fisheries are to incorporate the 12-mile zone advocated by the Defense Department with certain preferential rights outside the 12-mile zone for coastal States. SW

9.15

Parasites of marine fish are similar to those found in fresh-water fish. Two genera of protozoans associated with mortality in fresh-water fish culture are Scyphidia and Trichodina. Monogenetic trematodes are also a problem. Alimentary parasites such as digenetic trematodes, nematodes, and cestodes seldom cause problems.

Additional research is needed to determine effective chemical treatment to control fish parasites in brackish and salt water.

[6 tables, 4 references] SW

9.16

USE OF A NARCOTIC MIXTURE DURING THE TRANSPORTATION OF LIVE FISH

Strebkova, T. P. (Vses. Nauchno-Issled. Inst. Rybn. Khoz. Okeanogr., Moscow, U.S.S.R.)

Chemical Abstracts 76, No. 21, 121513x (May 22, 1972)

9.16 (9.14)

will develop into larval tadpoles in about 2 to 3 days. Growth of bullfrog tadpoles is rapid with adequate feeding; in about 3 months a 10-cm. tadpole enters the metamorphosis stage. Within 3 to 4 weeks they develop into the adult bullfrog morphology. During metamorphosis, tadpoles do not feed; at the end of this stage they weigh 50% less than at the start. Available commercial animal feeds disassociate in water. Other feeds cannot be grasped by tadpoles, and they also disintegrate in the water. Good growth in tadpoles was produced in tests of rabbit pellets, chicken feed, and trout chow, but the feeds did not have good water resistance characteristics. Using these basic feed formulae (ground to pass through a 1.0 mm. screen) studies were made of various binders. Alginate, pregelatinized starch, and gelatins were tried. It was determined that Knox gelatin was most effective in binding rabbit feed in the proportion of 4 g. of gelatin to 300 ml. of hot water, especially when the feed was added after the solution jelled. In addition, on this feed, growth of tadpoles was rapid and no adverse effects were seen. Preliminary work indicates that many commercial feeds can be bound into pellets using gelatin.

[6 references] SW

9.16

A COMPACT RECIRCULATION UNIT FOR THE REARING AND MAINTENANCE OF FISH

Scott, K. R., and D. C. Gillespie (Fisheries Research Board of Canada, Freshwater Institute, Winnipeg, Manitoba R3T 2N6, Canada)

Journal of the Fisheries Research Board of Canada 29, No. 7, 1071-1074 (July 1972)

The article describes a compact recirculation system for rearing rainbow trout. In an 8-month-long experiment, 75 kg. of trout could be maintained in a healthy condition in a 1,600-liter tank, using a makeup water rate of 1.0 liter/min. (about one tank volume per day). The levels of temperature, oxygen, pH, ammonia nitrogen, and nitrate nitrogen were controlled satisfactorily. The unit costs about $3,000. FTP

[3 figures, 14 references]

9.16 (1.18)

METHOD FOR GROWING OYSTERS

Down, Russell J. (Holmes Landing Road, Cape May Court House, Cape May County, NJ 08210) (pat.)

U.S. Patent 3,675,626 (July 11, 1972)

This apparatus provides for a method of growing oysters on rings made of the bead and a portion of the side wall of vehicle tires. The rings are attached to each other to form a column and are placed on the bottom of a body of water where the seed oysters are to be grown. The column can be removed to an oyster processing area where the seed oysters are harvested.

9.19 (9.2) RESIDUALS CHARGES FOR POLLUTION CONTROL: A POLICY EVALUATION

Freeman, A. Myrick III (Bowdoin College, Brunswick, Me.), and Robert H. Haveman (University of Wisconsin, Madison, WI 53706)
Science 177, No. 4046, 322-329 (July 28, 1972)

Card A

Failure of the existing pollution control strategies has led to examination of alternatives. There is growing interest in one alternative which would involve a significant departure from present policies; the strategy of creating economic incentives for pollution control by levying taxes or charges on residual wastes discharged to the environment. Five years ago, the residuals charge strategy was opposed by business, Government, and environmental groups. Now the President and his advisors, environmental groups, and members of Congress endorse the principle of residuals charges. Congress and several states are considering proposals that would raise the cost of discharging harmful wastes to the environment. In spite of growing acceptance of the concept of residuals charges criticism, based upon misconceptions and confusion, has appeared. This article seeks to clarify the issues.

The case for residuals charges rests on the acceptance of two primary propositions. First, in a market economy, prices play a major and valuable role in the allocation of resources to uses that will be of the highest value. Second, degradable environmental resources, unlike most other resources, are now outside the scope of the market system, and the uses to which they are put are not subject to the guidance of prices. Furthermore, the indicators to economic decision makers in the market system are the prices of goods and resources. In the case of environmental resources, the price indicators are absent. Land, labor, and, capital

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9.19 (9.2) RESIDUALS CHARGES FOR POLLUTION CONTROL: A POLICY EVALUATION

Freeman, A. Myrick III (Bowdoin College, Brunswick, Me.), and Robert H. Haveman (University of Wisconsin, Madison, WI 53706)
Science 177, No. 4046, 322-329 (July 28, 1972)

Card B

discharges and the price (or residuals charge) must be set high enough to ration this fixed supply among those who wish to make discharges. If an initial charge fails to attain the quality standard the charge should be raised until the standard is met.

A frequent criticism of this strategy is that it allows those with financial means to buy their way out of effective environmental control. The economic incentive to reduce the costs per unit of waste discharged is expected to discourage those who, in effect, would have to continually purchase the right to discharge wastes.

Critics from industry argue that residuals charges would cripple their ability to finance pollution control equipment. The purpose of a residuals charge strategy is to remove pollution control efforts from dependence on a notion of social responsibility. The economic incentives of the residuals charge will make continued discharges so costly that abatement investments will become profitable, and industry will find the financial resources to undertake these activities.

The practice of imposing sewer (or user) charges for services of municipal sewer systems is acceptable to those who argue that residuals charges are not acceptable because no service that entails cost is rendered. A service of value is indeed rendered to those who discharge wastes into a natural system; furthermore,

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9.19 (9.2) RESIDUALS CHARGES FOR POLLUTION CONTROL: A POLICY EVALUATION

Freeman, A. Myrick III (Bowdoin College, Brunswick, Me.), and Robert H. Haveman (University of Wisconsin, Madison, WI 53706)
Science 177, No. 4046, 322-329 (July 28, 1972)

Card C

water pollution control will be less than 1% of the value of shipments. Such costs would have a smaller impact than a 5% increase in wage costs. Reductions of air pollution would cost about the same amount.

Will those firms with market power escape the incentive effect of residuals charges by raising prices sufficiently to pass the full amount on to the consumer? In such an event pollution would be curbed by lower demand due to higher prices. However, the modern corporation seeks constantly to reduce costs of production; the economic incentive will remain as an influence. The effect of residuals charges on a public regulated utility is problematical; it may seek a rate increase rather than abatement of pollution to offset the charge. A proposed tax on sulfur dioxide emissions will affect users of fossil fuels, usually utilities. The authors believe that the tax, if it is keyed to air quality standards, will be more effective than direct regulation-enforcement of emission standards.

Another opinion, reported elsewhere, concluded that, with reference to water quality, residuals charges would make implementation of a comprehensive environmental management program more difficult. This conclusion is incorrect. Comprehensive plans of river basins must be the basis on which appropriate effluent

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9.19 DDT: INHIBITION OF SODIUM CHLORIDE TOLERANCE BY THE BLUE-GREEN ALGA ANACYSTIS NIDULANS

Batterton, J. C., G. M. Boush, and F. Matsumura (Department of Entomology, University of Wisconsin, Madison, WI 53706)
Science 176, No. 4039, 1141-1142 (June 9, 1972)

The fresh-water blue-green alga Anacystis nidulans was able to grow in regular medium [C. Van Baalen, J. Phycol. 3, 154 (1967)] containing 1% NaCl and in regular medium containing 800 parts per billion of DDT [1,1,1-trichloro-2,2-bis-(p-chlorophenyl)ethane], but growth of the organism was inhibited in the presence of both compounds. This inhibition of growth was reversed when the calcium content of the growth medium was increased (see the table that follows). The authors speculate that inhibition of (Na^+, K^+)-activated adenosine triphosphatase by DDT causes the A. nidulans to lose the ability to tolerate sodium chloride. The finding that the toxicity of DDT increases at high NaCl concentrations is important in view of the fact that blue-green algae are primary producers.

(over)

9.19 (9.2)

this manner of waste disposal entails real social costs in the form of damaged recreation areas, injuries to health, and possible sacrificed longevity of residents. It is the existence of these costs, and the absence of any institutions for imposing them on those who use the environment for waste disposal which make pollution a problem for public policy. In addition, the laws recognize public ownership in common property resources. A residuals charge policy would assert that what the public has the right to give away through licenses it can also charge a price for.

Several observers have argued that because accurate monitoring of residual flows is not practical, a residuals charge is not a feasible alternative. Measurement technology is available at reasonable cost relative to control of the more significant and ubiquitous pollutants. Any pollution control strategy, to be effective, would require accurate and continuous measurement of discharges.

In the absence of complete knowledge concerning costs of waste discharge reduction, a regulation-enforcement system can achieve a quality standard, but at a cost which is likely to be substantially above the minimum obtainable. Under similar circumstances the residuals charge system would achieve pollution reduction at minimum cost, but with some trial and error charges, in order to find the exact charge at which the quality standard is attained.

Will residual charges through their impact on production costs raise prices and lead to inflation? Inflation is defined as a condition of continuously rising prices for all goods. A residuals charge would cause a one-time rise in the price of goods responsible for large amounts of pollution. A rise in price of these goods is, in itself, an instrument of pollution control, since higher prices cause reductions in demand and corresponding reductions in pollution. It is estimated if all industries undertake secondary waste treatment by 1974, the annual cost of

[Continued on Card C]

9.19

Culture of *A. nidulans* in:	Growth rate of *A. nidulans* in Cg10 medium containing:			
	25 mg. of $Ca(NO_3)_2$ per liter		125 mg. of $Ca(NO_3)_2$ per liter	
	No NaCl	+1% NaCl	No NaCl	+1% NaCl
Cg10 medium	2.01±0.12(a)	1.41±0.13(a)	1.89±0.08(b)	1.84±0.05(b)
Cg10 medium +800 p.p.b. of DDT	1.95±0.10(a)	0.0(a)	1.80±0.07(a)	1.53±0.10(a)

(a) Significant difference between NaCl-treated and untreated cultures at 99% confidence.
(b) No significant difference between NaCl-treated and untreated cultures.

[2 tables, 19 references] FTP

9.19 METHODS FOR STUDYING THE EFFECT OF POLLUTION ON THE BIOLOGICAL PRODUCTIVITY OF BODIES OF SEA WATER

Kasymov, A. G. (Inst. Zool., Baku, U.S.S.R.)
Chemical Abstracts 77, No. 4, 24590h (July 24, 1972)

9.19 (9.2)

have prices, but public lands and watercourses, the atmosphere, have no price because no one owns them. These resources are then treated by everyone as free goods. When scarce resources are made available at zero prices, and with no nonmarket control of their use, they are over used.

There are two possible solutions to overuse of common property resources. One solution is the regulation-enforcement strategy; the other solution is to reproduce the effect of private markets by charging a price to those who would use the common property resource. The price would then allocate or ration the resource.

Under a system of residuals charges, the Government would be paid a price for each unit of waste discharged into a common resource. Dischargers are led to compare the cost of using the environment for waste discharge, as reflected to them by the residuals charge, with the cost of handling their waste disposal problem in another manner. The only guide is the relative costs of the different waste disposal procedures. Producers of wastes will reduce their discharges to the environment provided the marginal cost of waste treatment is less than the price or marginal cost of discharging wastes to the environment. In this manner environmental resources can be brought into the economic system with the same incentives that induce efficiency in the use of labor, capital, and land.

In the residual charge strategy the appropriate charge for a particular pollutant should equal the marginal or incremental damage caused by the pollutant measured in dollars. However, reliable information for setting charges on this basis is not available. A misconception regarding residuals charges is the belief that such charges can be implemented only if the damage is known in terms of dollars. The economic logic of the residuals charge strategy provides for a charge to be imposed that is consistent with Federal Government environmental standards. In economic terms the Federal standard establishes a maximum supply of permissible

[Continued on Card B]

9.19 (9.2)

charge schedules are calculated; furthermore, if new collective facilities are revealed to be part of the least-cost plan, they should be financed and constructed on the basis of the comprehensive plan.

There have been repetitions of the statement that the residuals charges strategy would be too complex administratively to be workable. The authors state that this strategy would be simpler to administrate and more effective than regulation because there will be less opportunity for powerful interests to gain special advantages through low visibility negotiations with a regulatory agency. The authors contend that the regulatory agencies (established by the Government to further the public interest) favor the interests of those being regulated.

The authors conclude that the current regulation-enforcement approach has failed due to its political and administrative difficulties. A new environmental strategy which minimizes reliance on regulation-enforcement and emphasizes the use of economic incentive to achieve changes in behavior seems desirable on political and theoretical grounds. They believe that limited and carefully prepared experiments with residuals charges should be undertaken to determine the viability of the approach.

[34 references and notes] SW

9.19 PURIFICATION OF THE EFFLUENT WATER IN THE MEAT AND FISH INDUSTRY

Baldacci, Pier V., Armando Canuti, and Gilberto Coppiardi (Lab. Chim. Prov. Cremona, Cremona, Italy)
Chemical Abstracts 77, No. 4, 24501e (July 24, 1972)

9.19 (1.87) HISTOLOGICAL CHANGES IN LOBSTERS (HOMARUS AMERICANUS) EXPOSED TO YELLOW PHOSPHORUS

Aiken, D. E., and E. H. Byard (Fisheries Research Board of Canada Biological Station, St. Andrews, New Brunswick, Canada)
Science 176, No. 4042, 1434-1435 (June 30, 1972)

An industrial discharge of yellow phosphorus killed fish and crustaceans in Long Harbor, Newfoundland. Studies were performed to determine the toxic effects of yellow phosphorus on lobsters.

Juvenile lobsters were held in tanks of aerated sea water containing various concentrations of phosphorus-contaminated mud obtained from the polluted site in Long Harbor.

Tissues were removed from 16 moribund lobsters and 2 controls that were killed by asphyxiation in oxygen-free sea water. A second control group was quickly killed.

Of the lobsters exposed to the lethal phosphorus suspensions, only the antennal gland and the hepatopancreas showed signs of degeneration. None of the controls had any signs of degenerative changes. Lobsters suffering from lethal exposure to yellow phosphorus die in a way that is characteristic of asphyxiation. In addition, blood in the cardiogastric region becomes thick; coagulation continues until the thorax is filled with gelled blood. The authors suggest that phsophorus activates the hemolymph clotting mechanism of the lobster which causes asphyxiation.

The clot initiating factor is an intracellular calcium-dependent transglutaminase which is released from ruptured hemocytes by exposure to yellow phosphorus

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9.19 (9.15) MERCURY IN MARINE ORGANISMS OF THE TAY REGION

Jones, A. M., Yvonne Jones, and W. D. P. Stewart (Department of Biological Sciences, University of Dundee, Dundee, Scotland)
Nature 238, No. 5360, 164-165 (July 21, 1972)

[The River Tay empties into the Firth of Tay at the city of Perth in northeastern Scotland. The Firth of Tay, an arm of the North Sea, is about 30 miles long. The town of Broughty Ferry is on the north shore of the Firth of Tay and inland of the point where it joins the North Sea. Arbroath is a coastal town on the North Sea, and is about 10 miles north of the Firth of Tay. The city of Dundee is situated on the north shore of the Firth of Tay a few miles west of Broughty Ferry. Abstractor's note]

Mercury concentrations were investigated in marine algae and molluscs which were collected from the littoral zone at Broughty Ferry (an estuarine environment), and from a coastal area north of Arbroath.

Mercury was determined by flameless atomic absorption spectrophotometry. The results were expressed on a wet weight and on a dry weight basis. High levels of mercury were found in the algae (0.319 to 25.537 µg. Hg $g.^{-1}$, dry weight) and molluscs (0.112 to 2.112 µg. Hg $g.^{-1}$, dry weight) collected near Broughty Ferry. No mercury was found in the organisms collected on the coast north of Arbroath. That mercury was present in appreciable levels at several trophic levels in the Tay estuary is shown by the concentrations found in three feeding types of molluscs: a suspension feeder, a herbivore, and a carnivore.

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9.19 (9.2) POPULATION AND POLLUTION IN THE UNITED STATES

Ridker, Ronald G. (Resources for the Future, Inc., 1755 Massachusetts Ave., N.W., Washington, DC 20036)
Science 176, No. 4039, 1085-1090 (June 9, 1972)

A simple model is described showing the links between environmental pollution on the one hand and population and per capita incomes on the other. The article points out (1) that no single cause is sufficient to explain the United States' environmental problems and (2) that there is little about the pollution problems this country is likely to face during the next 50 years that is inevitable.

The author states that it would not be difficult to devise government policies that would alter the composition of consumption and induce technological developments that could have significant positive effects on the parameters, nor is it impossible to bring about beneficial changes in the distribution of population and in our institutions. Furthermore, he states that it is not impossible that improvements from these changes during the next 50 years could offset the effects of population growth, per capita incomes, and other factors working in the opposite direction.

Nevertheless, great changes in attitudes and behavior patterns are likely to be necessary. A slowdown in population growth would provide us with more time (1) for vestiges of attitudes and institutions developed in frontier days to die off, (2) for the power struggle between vested interest groups to be played out, and (3) to devise and implement solutions.

[1 figure, 3 references] FTP

9.19 OIL POLLUTION: PERSISTENCE AND DEGRADATION OF SPILLED FUEL OIL

Blumer, Max, and Jeremy Sass (Woods Hole Oceanographic Institution, Woods Hole, MA 02543)
Science 176, No. 4039, 1120-1122 (June 9, 1972)

The facts presented in this article indicate that oil products and crude oils have a considerable persistence in the environment.

Approximately 600 metric tons of number 2 fuel oil were spilled in Buzzards Bay, Mass., on 16 September 1969. Following the spill three distinct series of events took place. Within the first few hours and days after the spill, there was a heavy kill of organisms that came in contact with the oil (this effect extended over all phyla and over benthic and intertidal organisms). After weeks or months of the spill, the oil spread to areas that had not been touched initially and the kill area was extended. For a considerable time after the oil spill, the oil prevented resettlement of the sediments by the original fauna. Now, 2 years later, fuel oil hydrocarbons still persist in the marsh and in offshore sediments; however, degradation of the oil is evident. With these chemical changes in the oil, the immediate toxicity of the oil in the sediment has been reduced. This reduction in toxicity has permitted some resettlement of the polluted region.

Apparently, hydrocarbon degradation proceeds slowly, especially below the surface of the sediment, and takes place principally through microbial action on the alkanes and through partial dissolution of the lower-boiling aromatic hydrocarbons. These observations are in agreement with the known geochemical stability of hydrocarbons. [2 figures, 8 references] FTP

9.19 (9.15)

The distribution of mercury in the organisms was studied. In the alga Fucus vesiculosis, the highest levels were found in the stipe and holdfast. In the remainder of the thallus there was a gradual increase toward the apical region. The concentration of mercury in the mollusc Mytilus edulis (L.) was greatest in the ctenidia, which may represent the principal organs of uptake and release. The concentrations of mercury varied during a 9-day period, which indicated rapid accumulation and loss in the algae studied.

High levels of mercury were found in the liver and kidneys of a gray seal and an eider duck. Both had died from causes unrelated to mercury accumulations.
[3 tables, 12 references] SW

9.19 U.N. ENVIRONMENT CONFERENCE REPORT PUBLISHED FOR PUBLIC SALE (9.6)

Anonymous
Department of State Bulletin 67, No. 1733, 296 (Sept. 11, 1972)

The Department of State has arranged for publication of the report of the United Nations Conference on the Human Environment held at Stockholm, Sweden, June 5-16. The document, totaling 135 pages, will be reproduced by the National Technical Information Service (NTIS) of the Department of Commerce. Orders for the report should cite accession number PB-211-133 and the title, "Report of the UN Conference on the Human Environment, held at Stockholm June 5-16, 1972." Orders should be addressed to the NTIS, Department of Commerce, Springfield, VA 22151, accompanied by check or money order payable to NTIS for $3. Reprinted

9.19 (1.87)

or other agents. The authors suspect that clotting is not triggered directly by phosphorus but is an indirect result of damage to cells of the antennal gland and the hepatopancreas.

The lobster hepatopancreas is a lipid-rich organ that can concentrate yellow phosphorus to a level 1,000 to 2,000 times that in surrounding sea water. Yellow phosphorus can be rapidly cleared from lobsters by transferring them to uncontaminated water; the toxic effects on the lobster are cumulative and not rapidly reversed. Continuous exposure of the lobsters to phosphorus increases tissue damage until death occurs.
[1 figure, 8 references] SW

9.19 ECOLOGICAL ASPECTS OF PLUTONIUM DISSEMINATION IN AQUATIC ENVIRONMENTS. WHAT HAS PLUTONIUM DATA TO TELL US ABOUT OTHER TRANSURANICS

Noshkin, Victor E. (Woods Hole Oceanogr. Inst., Woods Hole, Mass.)
Chemical Abstracts 76, No. 25, 150574y (June 19, 1972)

9.19 ENVIRONMENTAL APPLICATIONS OF THE WEIBULL DISTRIBUTION FUNCTION: OIL POLLUTION

Mikolaj, Paul G. (Department of Chemical and Nuclear Engineering, University of California, Santa Barbara, CA 93106)
Science 176, No. 4038, 1019-1021 (June 2, 1972)

The Weibull distribution function is used here as a correlating model for statistically analyzing and interpreting environmental pollution data. In this article, pertinent features of the Weibull distribution function are summarized and several examples dealing with oil pollution are given to illustrate the method's potential.

The Weibull equation, an empirical three-parameter distribution function, is expressed in linearized form as:

$$\ln \ln [1 - F(\chi)]^{-1} = -\ln \alpha + \beta \ln (\chi - \gamma)$$

$F(\chi)$: cumulative probability that a variable will have a value of χ equal to or less than a given value.
α: a scale parameter
β: a shape parameter
γ: a threshold parameter.

The Weibull distribution function has been applied to fatigue (life) testing, quality control, particle size analysis, and odor threshold. The author believes that this is the first time that the Weibull distribution function has been applied to pollution monitoring problems. He suggests that the Weibull distribution may be applicable to environmental problems such as automotive emissions, pesticide and trace metal contaminant concentrations, marine fauna mortality, and others. It may be useful too in evaluating the effectiveness of pollution control measures.
[1 figure, 1 table, 8 references] FTP

9.19 MERCURY EMISSIONS FROM COAL COMBUSTION

Billings, Charles E. (Environmental Engineering Science, 740 Boylston Street, Chestnut Hill, MA 02167), and Wayne R. Matson (175 Bedford Street, Burlington, MA 01803)
Science 176, No. 4040, 1232-1233 (June 16, 1972)

O. I. Joensuu estimated the world amount of mercury (Hg) mobilized from combustion of coal at 3,000 metric tons per year [Science 172, 1027 (1971)]. Data on mercury content of fuels and emissions are needed relative to the problem of environmental mercury. This report presents data on mercury concentrations and flow rates in samples of coal, ash, water, fly ash, and flue gas from a large steam generator fired with pulverized coal. The furnace served a 755-Mw (net) steam turbine-driven, generator.

The mercury liberated during combustion of coal is discharged as vapor in the flue gas or retained in the furnace ash. In a furnace fired with pulverized coal, about 90% by weight of the mercury released appeared in the flue gas and about 10% remained in the furnace ash. For the furnace examined in this test, approximately 2.5 kg. of Hg per day are released in the flue gas discharge. The average concentration of Hg in the various materials was as follows (μg. of Hg per g. of material): coal, 0.3; furnace bottom ash, 0.2; recirculation duct and economizer hopper ash, 0.2; electrostatic precipitator hopper ash, 0.2; water return to river, 0.001; suspended fly ash, 0.2; and flue gas, 0.033. The authors indicate that the biological effects of the transport of airborne mercury are not known, and that the technology for control of mercury emissions from large (coal combustion) sources has not been developed.
[1 table, 9 references] FTP

9.3 SOVIET POLICY ON INTERNATIONAL REGULATION OF HIGH SEAS FISHERIES

Hayashi, Moritaka (Woodrow Wilson International Center for Scholars)
Cornell International Law Journal 5, No. 2, 131-160 (Spring 1972)
Card A

The increased fishing of the high seas by the various nations of the world has caused problems related to international law and conservation of fishery resources. To help resolve some of the these problems, fishing countries have concluded agreements, bilateral and multilateral, concerning fishing on the high seas. This article is a review of U.S.S.R. participation in such international fishing agreements and contains a discussion of the salient features of the U.S.S.R. approach to international cooperation in regard to high seas fishing. The four sections of the article deal with (1) the degree of sovereignty limitation recognized by the U.S.S.R. in the context of fisheries regulations, (2) the policy statements on the conservation of living resources of the seas, (3) treaty practice on high seas fisheries, and (4) the enforcement of high seas fisheries regulations.

There are four fisheries treaties classifiable as Normative Nationalist, six as Functional Nationalist, three as Functional Internationalist, and none as Normative Internationalist. The Normative Nationalists adhere to the strict notion of state sovereignty (nation-states deserve the resources to survive and prosper). The Functional Nationalists adopt the notion that although nation-states are no longer the best machinery for solving problems of high seas fisheries, they can still play a major part in their solution (they assume that the nation-state is still viable, perhaps the most useful institution to entrust decisions requiring political and economic power). The Functional Internationalists adopt the view that the international system has undergone a revolutionary change, and that nation-states are no longer the best institutions to serve the needs of men (they are

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9.3 SOVIET POLICY ON INTERNATIONAL REGULATION OF HIGH SEAS FISHERIES

Hayashi, Moritaka (Woodrow Wilson International Center for Scholars)
Cornell International Law Journal 5, No. 2, 131-160 (Spring 1972)
Card B

countries, belong to Functionalist models. All the treaties with only Communist participation are Normative Nationalist; all Functionalist treaties have non-Communist participation. Apparently Functionalists models are freer from ideological considerations. No Normative Internationalist treaty exists.

The author believes that the U.S.S.R. has demonstrated a rather strong willingness to make exceptions to her jurisdictional sovereignty in the fisheries aspects of international law, particularly so in the case of East-West arrangements. If this trend continues, development of closer East-West cooperation in the form of stronger Functionalist models in the fisheries area may be expected. Whether it will take the form of Functional Internationalist or Functional Nationalist may depend upon the future successful implementation of the inspection schemes of the ICNAF, NEAFAC, and IWC conventions. [112 footnotes] FTP

9.3 APOSTROPHE TO A TROUBLED OCEAN
(9.19)

Smith, George P., II (Environmental Protection Agency, Washington, D.C.)
Indiana Legal Forum 5, No. 2, 267-299 (Spring 1972)

The author discusses the menacing growth of marine pollution and the work that has started towards containing it. He discusses the emerging law of the seas, the various problems related to any proposed law for the seabed, the uses and abuses of the oceans, and the various resolutions relative to the area of marine pollution.

In conclusion, the author states that man's progressive achievements have been accompanied by progressive imbalances in the world ecosystem. After nearly exhausting the resources of the land, man has now turned his attention to the resources of the ocean. Replacements for foodstuffs and minerals taken foolishly from the land are to be found in the oceans--the opportunity is here again for man to start afresh.

What has been the past history on land must not be the beginning of the future for the oceans. New working concepts for the oceans must be employed in order to allow continued scientific advances. Law and science must work together toward a common goal of conserving the oceans. The problems raised by pollution of the environment, by conservation and development of the ocean resources, and by the economic needs of the developing countries require an innovative approach.

In the Epilogue, the author discusses the Draft Open Space Treaty presented by the Government of Malta in the United Nation's Seabed Committee for consideration of Pacem In Maribus II (The Second of two convocations held at Malta to

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9.3 THE TROUBLE WITH MERCURY: CAN DOMESTIC LAWS CONTAIN
(9.19) AN INTERNATIONAL THREAT?

Silverstein, David (Cornell International Law Journal, Cornell Law School, Ithaca, NY 14850)
Cornell International Law Journal 5, No. 2, 219-241 (Spring 1972)

Mercury pollution of the environment is a widespread and dangerous problem. But, the problem can be solved. It requires the concerted effort on the part of all nations against all forms of pollution. The United States, having shown interest in an international solution to pollution problems, should consider certain steps it can take domestically to pave the way for international agreement. Some of these steps are (1) enactment of effluent standards, (2) establishment of a technological review board, (3) legitimation of AID efforts to control pollution in host countries, (4) enforcement of controls over domestic corporations abroad, and (5) reconsideration of the Connally Reservation. [The "Connally Reservation" to the United States Declaration under Article 36(2) of the Statute of the International Court of Justice has cost the United States valuable foreign claims and may cost the United States the chance to ever play a major role in enforcing international pollution standards before the World Court. It reads as follows: ... the United States of America recognizes as compulsory ipso facto and without special agreement, in relation to any other State accepting the same obligation, the jurisdiction of the International Court of Justice in all legal disputes hereafter arising concerning treaties and questions of international law Provided, that this declaration shall not apply to ... (b) disputes with regard to matters which are

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9.3 (9.4)(9.6) INDEX TO MARINE TREATIES

Gamble, John King, Jr. (compiler) (Division of Marine Resources, University of Washington, Seattle, WA 98105)
Washington Sea Grant Publication WSG 72-2, 438 pp. (June 1972), Price $7.50. (Division of Marine Resources, University of Washington, Sea Grant Program, Seattle, WA 98105)

Because of the existence of a large number of marine related treaties, some system for locating detailed information contained in them was needed. This index provides for such need. It includes all marine treaties found in volumes 1 to 643 of the United Nations Treaty Series, in the Canadian Treaty Series from 1946 to 1967, and in the United States Treaty Series from 1950 to 1970. The index, thus, lists most of the world's marine treaties and virtually all of those to which the United States and Canada are party. It includes 400 treaties.

The index is divided into three sections. Part 1 is ordered alphabetically by content. Part 2 is ordered first by treaty number and then alphabetically by content. Part 3 is divided into broad topical areas, boundary and frontier matters, fishing and fisheries, navigation, commission or institution related, pollution and conservation, and miscellaneous. FTP

9.3 (9.19)

essentially within the domestic jurisdiction of the United States of America as determined by the United States of America ,...]

The decisive factor regarding mercury pollution is not how soon international agreement can be reached but rather what is done during the interim period. The author believes that if the necessary procedures and machinery could be established in advance by enough countries, with the United States leading as an example, any international agreement would be just a formality.
[104 footnotes] FTP

9.3 (9.19) LAW AFFECTING THE QUALITY OF THE MARINE ENVIRONMENT

Clingan, Thomas A., Jr. (University of Miami, Miami, FL 33124)
University of Miami Law Review 26, No. 1, 223-254 (Fall 1971)

The author reviews some of the current approaches to the solution of water pollution problems, particularly as they affect the oceans, in order to create a more coherent understanding of the adequacies and shortcomings of present legal remedies. Although great steps already have been taken, much remains to be done; the first step is an educated and properly motivated public, and just, evenly applied laws. The lawyer must learn to work closely with the scientist, economist, and the consumer to achieve what must become the common goal if the oceans are to survive now and for generations to come.
[148 footnotes] FTP

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conscious of those who use the oceans and are willing to perform services for users). The Normative Internationalists take the view that international bodies should have extensive jurisdiction over the matter of enforcing fishing regulations on the high seas (they hope that internationalizing all or part of the world's oceans or their resources is a key element in a great design to assure world peace and prosperity). The treaties can be placed on a national-international chart as follows:

Normative Nationalist	Functional	Functional	Normative Internationalist
←			→
West Pacific Research Agreement	IWC Conv.	ICNAF Conv.	
Black Sea Fishery Agreement	ICNAF Conv.	NEAFC Conv.	
King Crab Fisheries Agreement	NEAFC Conv.	IWC Conv. (proposed)	
Northeast Atlantic Seals Agreement	Northwest Pacific Fisheries Conv.		
	King Crab Fisheries Agreement		
	North Pacific Fur Seals Conv.		

All the high seas fishery treaties which are most significant in terms of the international fishing grounds they cover and of the participation by major fishing

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postulate workable proposals for resolution of problems concerning the protection and conservation of the oceans). This Draft Treaty contains 194 articles and 30 chapters, and attempts to update the present law of the seas. It abolishes the concept of the continental shelf. The ocean space is divided into "national" and "international" open spaces, with the dividing line set at 200 miles from shore. Within that line are additional lines at 12 and at 25 miles from shore that determine the space for various functions such as security and research. Basic rules involving activities on the ocean are set at the international level, but their enforcement is delegated to the coastal state. Revenues from exploitation of the living and nonliving ocean resources are for the benefit of the international community.

The freedom to fish on the open seas was deleted in the Draft Treaty for a "freedom of scientific research." This concept recognizes that freedom to fish is economically wasteful and ecologically dangerous, and that management of fisheries at an international level is needed to safeguard this common heritage of mankind. [142 footnotes] FTP

9.3 (9.19) POLLUTION PREVENTION IN THE ARCTIC--NATIONAL AND MULTINATIONAL APPROACHES COMPARED

Sutton, Gary
Ottawa Law Review 5, No. 1, 32-64 (1971)

This study discusses the legislative efforts of Canada relative to pollution in the Arctic and includes an examination of the multinational efforts of IMCO (Inter-Governmental Maritime Consultative Organizations) in dealing worldwide with similar problems. [122 footnotes] FTP

9.3 WHO IS TO CONTROL THE OCEANS: U.S. POLICY AND THE 1973 LAW OF THE SEA CONFERENCE

Stevenson, John R. (U.S. Department of State, Washington, D.C.)
International Lawyer 6, No. 3, 465-477 (July 1972)

The present crisis in the Law of the Sea is of vital importance to all citizens of the United States because it affects the mobility of U.S. naval and air forces, the development of the most important new resources of petroleum and hard minerals, and the availability of animal proteins from fish. Apparently bilateral conflicts between nations are escalating because of the increasing importance of their disagreement over legal rights in the ocean. The author reviews U.S. policy in light of the preparations for the upcoming 1973 Law of the Sea Conference, emphasizing the unsettled issues. He discusses the background and history of the crises and U.S. policy, the development of the freedom of the seas doctrine, the 1958 and 1960 Law of the Seas Conferences, the technological breakthroughs since World War II, the unilateral claims by coastal states, and United States policy.

The basic components of U.S. Oceans policy are summarized as follows:

(a) The U.S. proposed a move from the present position of a 3-mile territorial sea to an agreed 12-mile territorial sea, provided freedom of transit through and over straits used for international navigation is guaranteed.

(b) The United States has proposed that coastal states be given regulatory jurisdiction and preferential economic rights, based on their capacity to catch, with respect to coastal species of fish adjacent to their coasts as well as anadromous species (such as salmon) that spawn in their rivers but swim far out into the oceans before returning to the rivers where they originate.

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9.3 LAW OF THE SEAS IV

[Authors and titles listed below]
San Diego Law Review 9, No. 3, 383-746 (May 1972)
Card A

"Foreword. The Law of the Sea Negotiations 1971-1972 -- From Internationalism to Nationalism," by H. Gary Knight (Louisiana State Sea Grant Legal Program), pp. 383-389.

The author believes that the contributions contained in this report of the symposium may offer some of the most creative concepts yet in an effort to take "creeping nationalism" in stride and so handle it at the current Law of the Sea negotiations and in the 1973 Conference as not to forever prejudice the possibility of a meaningful international oceans regime.

"The Concept of 'Common Heritage of Mankind': A Political, Moral or Legal Innovation?" by Stephen Gorove (University of Mississippi School of Law), pp. 390-403.

The author briefly analyzes the meaning of common heritage as used in the phrase "common heritage of mankind" and indicates some of the difficulties inherent in the use of the term in current Law of the Sea negotiations. The concept of 'common heritage of mankind' carries no clear juridical connotation but belongs to the realm of politics, philosophy, or morality, and not law. Although the conclusion that the concept is not at the present time a legal principle but only a reflection of political aspirations does not imply any value judgment de lege ferenda (on the basis of new law). In fact, the author states, perhaps the time has come for the law to move in the direction of recognizing mankind's interests, its rights and obligations, as distinct from those of the nation state and provide for a fully representative international body with appropriate authority to act in its behalf. Perhaps, then, the United Nations may have taken a landmark decision

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9.3 LAW OF THE SEAS IV

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(as proposed in this article). The Federal role in fisheries management must be strengthened. Total Federal regulation and management is indicated in those fisheries clearly affecting the public interest. Assistance to the fisheries should be continued, but on a modified scale to conform to management decisions. The thrust of this assistance should be to increase information and incentives for the local fishermen. The author ends his article by asking "why not try something new?"

"Bridging the Gap to International Fisheries Agreement: A Guide for Unilateral Action," by Jon L. Jacobson (University of Oregon Law School), pp. 454-490.

National assertions of jurisdiction over ocean space for fisheries purposes "contributes to the creeping disintegration of an important area of the earth's surface that might otherwise, if given time, be set aside as the common heritage of mankind." The author proposes (in view of the apparent trend toward overexploitation of certain stocks of the world's commercial fishes, and in light of the proven incapacity of the international community to come to effective agreement on any important topic in anything like a timely fashion) coastal nations ought to be allowed to take emergency resource-protective action in the high seas within the following guidelines: (1) Any protective action must be in response to a demonstrable conservation crisis; (2) the protective action must concern solely the protection of the endangered resource, (3) the action must not unreasonably discriminate on the high seas against nationals of other nations, (4) the action must

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9.3 LAW OF THE SEAS IV

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would apply; (5b) substantive limitations on such coastal state rights; (6a) rights of individual states to explore and exploit the natural resources of the seabed beyond the limits of the continental shelf; (6b) rules and conditions under which such exploration and exploitation would take place; and (6c) institutional and legal means of administering such exploration and exploitation and of resolving disputes arising from such activities.

The conferees at the next Law of the Sea Conference will seek to negotiate mutually satisfactory answers to the foregoing major questions.
[33 + 1 + 1 footnotes]

"Recent Developments in the Law of the Seas III: A Synopsis," by G. Edward Arledge, Allan A. Nadir, and Robert L. O'Connell (San Diego Law Review, University of San Diego, San Diego, Calif.), pp. 608-746.

This third synopsis is part of the continuing effort of the editors of this journal to present annually a summary of legally significant events relevant to the law of the seas. The synopsis covers the period between March 1, 1971, and February 1, 1972. The primary sources utilized in preparing the synposis consisted of the New York Times, the Environment Reporter, the United States Code Congressional and Administrative News, and the Congressional Record. This synopsis should be of interest and of use to those concerned with the area of the law of the seas and its importance to man's future, and to the Third United Nations Conference on the Law of the Seas in 1973. FTP

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by declaring the seabed and the ocean floor beyond the limits of national jurisdiction to be the common heritage of mankind. [39 footnotes]

"The Council of an International Sea-Bed Authority," by Louis B. Sohn (Harvard University, Cambridge, Mass.), pp. 404-431.

The international regime for the exploration and exploitation of the seabed to be agreed upon at the 1973 Law of the Sea Conference will consist of a basic set of rules and an international machinery for the implementation of these rules. The article contains a discussion of the problems involved in structuring the decision-making organ of an international oceans organization so that (1) it will be politically acceptable to all interests and (2) it will be operatively functional. If a meaningful international regime is adopted, this may be the single most important feature of the international machinery because the decisions made by the "Council" will be the basis for all seabed operations. The author gives his suggestions for a more representative Council of the future International Sea-Bed Authority and proposes a number of alternative patterns. The work is, therefore, of interest to those who must identify the issues, consider the alternatives, and negotiate the regime to be adopted at the Third Conference of the Law of the Sea. [45 footnotes]

"A Second Look at United States Fishery Management," by Thomas A. Clingan, Jr. (University of Miami, Fla.), pp. 432-453.

In the management and regulation of U.S. fisheries, a combination of factors, including maximum sustained yield and maximum economic yield, should be used by a group on as low a level in the bureaucratic system that is competent to deal with the totality of the stock. Industry participation at this level is essential. Limited entry will probably play an essential role if the fisheries are to grow and prosper. Decisions should be under the supervision of a Federal advisory group

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(c) The United States has proposed, relative to the seabed's mineral resources an intermediate zone approach--an area of mixed coastal state and international jurisdiction between the area of coastal state sovereign rights and a fully international area beyond.

(d) The United States supports maximum freedom of scientific research, with maximum efforts to ensure dissemination of the results of such research.

(e) The United States is seeking to bring ocean pollution under effective international regulation in a number of different forums.

The author believes that it would be a serious mistake for the General Assembly of the United Nations to postpone the Law of the Sea Conference beyond 1973. It is important to the success of the Conference that governments begin to take the hard political decisions on which a consensus may be based; delay would only increase the difficulty. The law of the sea must be modernized by general international agreement; otherwise, it will give way to a partition of the oceans and contribute to a disintegration of international law generally. However, the present crisis does present a challenge because if the international community can develop effectively functioning international law and institutions for the oceans, greater reliance might eventually be placed on such law and institutions generally.

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9.3 A DRAG ANCHOR ON KNOWLEDGE: THE LAW OF THE SEA AND MARINE RESEARCH

Woodhead, William (Utah Law Review)
Utah Law Review 1971, No. 4, 524-543 (Winter 1971)

In this note, the author discusses the current law of the sea as it affects fundamental research, explores some suggested approaches for improving the situation within and without the current legal regime, and draws some conclusions as to what form the recommendations for altering the existing legal framework should take in order to meet the requirements of marine science research.

Developments in the law of the sea relative to the extent and limits of coastal state jurisdiction have brought about restrictions on the freedom of scientific research in the ocean environment. The present legal restrictions are likely to cause even greater problems in the future if the present legal framework is retained. Any further discussion of ocean law must consider the needs of the scientific community; a multilateral convention devoted only to requirements of the scientific community. This scientific convention, alone, should govern scientific activities.

The author concludes that the creation of an effective regime for scientific freedom will further enhance man's knowledge of the ocean area and will reap benefits that will serve all persons in the world equally and extensively. [100 footnotes]

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carry an automatic termination time, and (5) the protective action must be accompanied by a clear call for international agreement. [121 footnotes]

"The Deep Seabed Hard Mineral Resources Bill," by F. M. Auburn (University of Auckland, New Zealand), pp. 491-513. [133 footnotes]

"Oil Pollution Problems Arising Out of Exploitation of the Continental Shelf: The Santa Barbara Disaster," by David J. Walmsley, pp. 514-568.

The author discusses the problems of using the United States' legal system to secure redress for damages resulting from oil pollution at sea and to prohibit or regulate such activities in the future. [253 footnotes]

"The Donneybrook Fair of the Oceans," by David B. Stang (George Washington University), pp. 569-607.

Major questions which many states feel were not resolved with adequate precision and detail in the text of the four 1958 Geneva Conventions on the Law of the Sea, or which need be reexamined with a view toward finding new answers are (1) the limits, seaward, of the territorial sea; (2) the precise limits, seawards, of the continental shelf; (3a) measures that coastal states may take in high seas areas adjacent to their coasts to regulate the activities of foreign fishing fleets and the distance from the coastline in which such coastal state rights would apply; (3b) substantive limitations on such coastal state rights; (4a) measures that coastal states may take in high seas areas adjacent to their coasts to protect themselves against marine pollution caused by foreign states or their nationals and the distance from the coastline in which such coastal state rights would apply; (4b) substantive limitations on such coastal state rights; (5a) means which coastal states may take in high seas adjacent to their coasts to regulate the conduct by foreign nationals of scientific research on the high seas and underlying seabed and the distance from the coastline that such coastal state rights

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9.3 (9.19) SYMPOSIUM THE HUMAN ENVIRONMENT: TOWARD AN INTERNATIONAL SOLUTION

[Authors and titles listed below]
Natural Resources Journal 12, No. 2, 133-277 (April 1972)
Card A

"Towards a New Methodological Approach in Environmental Law," by Dante A. Caponera (FAO Legal Office, FAO, Rome, Italy), pp. 133-152.

The problems of protecting the environment are new ones everywhere in the world, and the existing legal and administrative structures preclude rapid and all-embracing solutions. The task of the legislator is a difficult one due to the technical, scientific, economic, and social implications of the problems. New legal and institutional tools are needed to secure rational exploitation of the natural resources. Future action should consider two main parts. The first would be an examination of existing laws and institutions in any interested state and in other nations to determine their functional value, and then to seek overall solutions for which present laws and institutions may not be adequate. The second would be the study and enactment of new laws regulating those products which cause the degradation or pollution of the environment, involving standards, quality, manufacture, and marketing. In the meantime, there is a need to develop new legal and institutional structures that are designed in such a way as to deal with each and every natural resource in its entirety and each and every respect. Finally, the development of new legal and institutional structures should be considered that are able to recognize and define the rights of each individual and of the community at large to a decent environment as one of the basic human rights. [41 footnotes]

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9.3 (9.19) SYMPOSIUM THE HUMAN ENVIRONMENT: TOWARD AN INTERNATIONAL SOLUTION

[Authors and titles listed below]
Natural Resources Journal 12, No. 2, 133-277 (April 1972)
Card B

"Pollution & Liability Problems Connected With Deep-Sea Mining," by L. F. E. Goldie (International Legal Studies Program, Syracuse University College of Law, Syracuse, N.Y.), pp. 172-181.

This article is a discussion of the liability issue as a deterrent to pollution of the sea as a relatively inferior, insensitive, and unsatisfactory weapon of remedy and control. [28 footnotes]

"The Resolution of Uncertainty," by Harold P. Green (George Washington University), pp. 182-186.

There appears to be a need for building into the political process some device for identifying and impressing upon the public, in a comprehensible manner, the fact that uncertainty exists as to the potential environmental effects of technology. The author believes that scientific questions, no less than economic and social questions, should be resolved in the crucible of uninhibited political debate in the faith that a democratic people is entitled, rationally or irrationally, to the public policies it wants, and that in the long run truth will prevail.

"The Human Environment: Problems of Standard-Setting and Enforcement," by Ian Brownlie (Wadham College, Oxford, England), pp. 187-194.

Legal standards, procedures, and institutions are only effective if the politicians, the administrators, and the public are convinced of the importance of

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9.3 (9.19) SYMPOSIUM THE HUMAN ENVIRONMENT: TOWARD AN INTERNATIONAL SOLUTION

[Authors and titles listed below]
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requirements; and (4) recognition and assessment of environmental problems and measures for abatement and control require considerable research and development work, which could be done more rapidly and less expensively if knowledge and experiences could be exchanged between states. The author discusses the present stages of international considerations regarding environmental protection and the chances that regulations dealing with common (frontier) problems have of being included in bilateral international agreements. [15 footnotes]

"Legal Responses to Pollution Problems--Their Strengths and Weakness," by Andrew R. Thompson (University of British Columbia, Vancouver, British Columbia, Canada), pp. 227-241.

The law can respond in four ways to pollution problems: (1) It can apply the coercive power of the State to the offender, (2) it can manipulate the incentives and disincentives of the economic system to bring pressure on the pollution offender, (3) it can organize the administrative and institutional structures of the State to control the offender, and (4) it can contribute to the consciousness of citizens that the natural environment must not be abused. The article is a discussion of these four types of responses. [50 footnotes]

"National Sovereignty in International Environmental Decisions," by Charles R. Ross (Hinesburg, VT 05461), pp. 242-254.

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9.7 UNDERGRADUATE EDUCATION OF FISHERY SCIENTISTS

Royce, William F. (College of Fisheries, University of Washington, Seattle, WA 98195)
Fishery Bulletin 70, No. 3, 681-691 (July 1972)

No single curriculum is ideal for training in fishery science. The field has become much too broad and includes too many specialties that each require a high level of training. The specialization is expected at graduate level, of course, but is desirable even at undergraduate level if students can anticipate either the graduate work or the type of job they will enter.

A corollary of the above conclusion is that a person with a terminal baccalaureate degree should not be a dropout from a research-oriented, two-degree or three-degree program. A majority of the jobs in fishery science has been held and probably will continue to be held by people with only a baccalaureate degree. Some of these jobs will be major administrative, decision-making jobs with rewards equal to those that will be open to holders of a doctorate degree.

A biology or zoology undergraduate major may be good preparation for graduate work in fisheries, but it is relatively poor preparation for a job. Advanced biology courses in general are much less useful than courses in English composition, public speaking, fishery science and management, and the quantitative sciences.

Student and faculty opinions about curricula are probably not the best guides. Both differ substantially from the opinions of a majority of the nonteaching professionals in the field, especially in their evaluation of subjects that develop the ability to deal with people.

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protection. Legal intervention must be part of a well-developed economic and social program, accompanied by well-informed persuasion.

"Global Pollution and Human Rights," by Abel Wolman (Johns Hopkins University, Baltimore, MD 21218), pp. 195-210.

Law alone, at least from past experiences, does not produce the desired result of protecting human rights, when certain ingredients in policy and action are missing. This is true because human behavior is complex, often selfish, often unpredictable, and often ignores human rights. The support provided by law assists in the protection of man and nature provided public intent, economic pressures, health, and safety so validate the law. [10 footnotes]

"The Individual and the Environment," by Christian de Laet and Susan Singh (Canadian Council of Resource and Environment Ministers), pp. 211-217.

The one area, which appears to hold the key to environmental pollution control, is through the development of the public conscience, an attempt to have people reassume the burden of the individual and collective responsibility that forms the cornerstone of our jurisprudence. This requires public dialogue on current and changing values, doctrines, and choices so that the responses formulated may be characterized by relevance, clarity, and finality. [5 footnotes]

"Chances and Problems of International Agreements on Environmental Pollution," by Klaus Boisserée (Ministry of Labor, Dusseldorf, Federal Republic of Germany), pp. 218-226.

Reasons for international agreements on environmental protection are (1) air and water pollution do not stop at national frontiers; (2) all methods of reducing environmental pollution constitute an economic burden for owners and operators of installations, therefore different requirements may result in distortions of competition; (3) trade obstructions may result from differing environmental protection

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9.3 (9.19)

"The Changing Structure of International Policy: Needs and Alternatives," by Lynton K. Caldwell (Indiana University, Indianapolis, IN 46204), pp. 153-160.

Regardless of their scientific content, the tasks of environmental protection, restoration, and management are social. Furthermore, they are institutional because human societies cooperate only through established sets of relationships and procedures. Man's social, economic, and political institutions have not developed in a manner consistent with the realities of the biosphere. As a part of the price of human survival and of an environmental future, institutions will have to be reshaped at all levels of human organization to cope with the problems of man-environment relationships that man himself has mainly created. These institutions should be developed in light of the following propositions: (1) The institutions for the administration of environmental policy, at all governmental levels, should be flexible, and should be capable of growth and transformation. (2) These institutions should be strengthened for environmental protection, bringing them into more consistent and mutually supportive relationships. (3) New institutions may need to be created because of the novelty of the tasks and of their worldwide character. (4) Finally, environmental considerations cannot be effective unless they are built into (thus modifying) man's so-called "development" activities.

"Environmental Policy as a World Order Problem," by Richard A. Falk (International Law, Princeton University), pp. 160-171.

This article explores, from the legal aspect, the modern encounter between man and his environment in its global aspects. The author suggests that the present international legal system can generate, at best, stopgap measures that will defer the day of ecological reckoning, but that there is no realistic prospect that the conditions giving rise to this dangerous situation can be eliminated by reforms that involve the establishment of new international law regimes.

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Courses in the social sciences, humanities, and liberal arts have not been as useful as people now want them to be. With a few exceptions these subjects were characteristically among those listed as the least useful. The exceptions are important as indication of needed improvements because they include courses in resource economics and administration--both public and business. These are courses that are relevant to real problems, and it would appear that many social sciences-humanities-liberal arts courses have not been relevant hitherto.

The high value of general courses in science, both basic and applied, and the mixed value of advanced courses indicate the importance of teaching the general courses especially well.

There are advantages in a fishery education that is interrupted by periods of work. The student can form definite opinions about specialties that he needs for the job that he has or wants. In addition almost everyone can benefit from refresher courses that cover new developments.

[4 tables, 10 references] Author's summary and conclusions

9.4 [THE INTERNATIONAL COMMISSION FOR THE FISHERIES OF THE SOUTHEAST ATLANTIC] (9.3)

LA COMMISSION INTERNATIONALE DES PÊCHES POUR D'ATLANTIQUE SUD-EST

Carroz, J. E. (Member of the Secretariat of FAO, Rome, Italy)
Canadian Yearbook of International Law 9, 3-29 (1971) (In French)

Published under the auspices of the Canadian Branch, International Law Association, by the University of British Columbia Press, Vancouver, British Columbia, Canada. FTP

9.3 (9.19)

The author discusses the development of pollution control policies which have arisen between the United States and Canada in recent years and exemplified during hearings on the problem of pollution control in the Great Lakes. [20 footnotes]

"The Development of International Environmental Law and Policy in Africa," by J. D. Ogundere (Nigerian Institute of International Affairs), pp. 255-270.

Africa has taken rapid strides in the last 10 years to develop, on the international level, solutions to environmental problems relating to fauna, flora, and water resources. In the next 10 years, Africa should concentrate on the problems of over-population, urbanization, and pollution. [60 footnotes]

"The Conservation of Migratory Animals Through International Law," by Cyrille de Klemm (UNESCO), pp. 271-277.

Migratory animals, for legal purposes, are of two groups: interstate migrants (birds and certain species of fish) and international migrants (marine animals such as seals, turtles, and some fish). If conservation measures for these marine animals are to be effective they must cover the whole range of migratory species, requiring agreement between all the countries concerned; this is an international problem whose solution must be found through international law.

[9 footnotes] FTP

0.4 METHYL MERCURY IN FISH. A TOXICOLOGIC-EPIDEMIOLOGIC EVALUATION OF RISKS

National Institute of Public Health, Sweden
Nord. hyg. Tidskr., Suppl. 4, 364 pp. (1971) (Stockholm)
BFMIRA Abstracts 25, No. 6, Abstract No. 2071, 418 (June 1972)

"The public health hazards of consuming fish contaminated with methyl mercury have been considered by a group of experts in Sweden. In a critical review of selected literature they assess analytical methods; the origin of organic mercury in the environment and in fish; its uptake and distribution in the body; symptoms and pathology of poisoning by methyl mercury; and the relations between exposure, organ concentration and degree of poisoning. They deduce from case histories that daily ingestion of about 0.03 mg of mercury, as methyl mercury, would lead to accumulation of proposed maximal acceptable levels in blood and hair, and they relate this figure to concentrations in contaminated fish and fish consumption in Sweden. A report of a symposium, held in Stockholm in 1968, on maximal allowable concentrations of mercury compounds in industry is appended." Reprinted

9.12 OCEANIC ELECTRIC FIELDS: PERCEPTION BY AMERICAN EELS?

Rommel, S. A., Jr., and J. D. McCleave (Department of Zoology, University of Maine, Orono, ME 04473)
Science 176, No. 4040, 1233-1235 (June 16, 1972)

It has been suggested that aquatic animals might use the weak electric fields generated in the ocean by water currents moving through the geomagnetic field for orientation or navigation. Earlier work has shown that certain nonmigratory fish are sensitive to weak electric fields; for example, sharks and skates are sensitive to an electric field of 0.01 μv./cm., and bullheads to 30 μv./cm. Because there were no data on the electrosensitivity of migratory fish species, the authors examined the response of the American eels (Anguilla rostrata) to uniform, weak electric fields. This paper reports on the responses of the eels to such electric fields in fresh water (resistivity 4,000 ohm cm.) and salt water (400 ohm cm., 40 ohm cm.).

The American eels consistently exhibited conditioned cardiac deceleration responses to electric fields as small as 0.167×10^{-2} microampere per square centimeter in water of resistivity 4,000 ohm cm. (6.7 microvolts per centimeter) and 400 ohm cm. (0.67 microvolt per centimeter). Fewer responses occurred at this current density (0.167×10^{-2} μamp/cm^2.) in more saline water (40 ohm cm., 0.067 μv./cm.) and at a lower current density (0.167×10^{-3} μamp/cm^2.) in fresh water. Nearly all the eels exhibited a conditioned response to perpendicular fields; no eels exhibited a response to fields applied parallel to their bodies.

The authors conclude that eels have sufficient sensitivity to electric fields to utilize geoelectric information for orientation.
[1 figure, 2 tables, 21 references] FTP

0.7 FATTY ACIDS IN FOODS SERVED IN A UNIVERSITY FOOD SERVICE

Guild, Louise, Dorothy Deethardt, and Elizabeth Rust (Department of Home Economics, South Dakota Agricultural Experiment Station, Brookings, SD 57006)
Journal of the American Dietetic Association 61, No. 2, 149-151 (Aug. 1972)

Fatty acid composition of lipids in milk, eggs, meat, and fats and oils has been reported elsewhere. No such information exists for foods served in large-quantity operations as in a restaurant.

An investigation was undertaken to determine the fatty acid composition of food portions served in meals. Samples were taken of 56 foods served at South Dakota State University student cafeteria. The samples were prepared for gas-liquid chromatographic analysis. The results were listed in a table which shows 12 major fatty acids in terms of carbon chain lengths and number of double bonds for each of the foods examined.

Although at least 53 separate peaks in chromatographic analysis were found, no single sample had more than 40. The foods with the largest number of peaks contained fat from more than one source; for example, chocolate chip ice cream had 40 peaks, and a tuna fish sandwich, 39.

The 56 foods studied included beef meat loaf, chili, stews, spaghetti, pizza, pork sausage, pork gravy, bacon-lettuce-tomato sandwich, and others, such as salads covered with dressings. Data are given for the following fishery items: tuna sandwich, tuna noodle casserole, and fried perch. The data indicated a greater variety of fatty acids than expected.
[1 table, 12 references] SW

9.2 AN EXPOSITION ON THE DEFINITION OF FISHING EFFORT
(9.12)

Rothschild, Brian J. (National Marine Fisheries Service, Northwest Fisheries Center, 2725 Montlake Boulevard East, Seattle, WA 98112)
Fishery Bulletin 70, No. 3, 671-679 (July 1972)

The term "fishing effort" is well defined in population dynamics literature. The term as defined in the population dynamics literature is, however, difficult to reconcile with broader definitions of fishing effort, particularly those having economic implications. The present paper discusses the distinction between the definitions and gives some examples in the context of allocating inputs, the capacities of fishing boats, and several stocks to the catch in a manner which maximizes profits. Managerial behavior is also an important input to the fishing process; this is discussed in a decision theory format where decision quality can be measured relative to entropy in the decision environment affording a comparison among decision environments in terms of information and an imputed valuation of a bit of information under various circumstances. The conventional measures of the quality of the decision environment are often based upon expected catch. Alternate measures are discussed which include the expected loss or the risk involved in the decision process.
[3 figures, 4 tables, 5 references] Author's abstract

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Trakatellis, Anthony C.	1	0.35
Tyler, A. V.	15	9.14
Varanasi, Usha	13	8.53
Velarde, E.	12	6.54
Viehweger, C.	7	2.3
Vorob'eva, T. M.	9	3.2493
Walmsley, David J.	26	9.3
Walsh, John J.	15	9.11
Watt, Bernice K.	15	8.59
Wiczynski, L.	7	2.3
Williams, Ernest H., Jr.	17	9.15
Williams, Marion P.	13	7.599
Windell, J. T.	11	6.51
Wiseman, P.	14	8.53
Wolman, Abel	28	9.3
Woodhead, William	26	9.3
Wright, Donald L. (pat.)	15	9.14
Yamada, Minoru	3	0.35
Yamaji, Kenji	1	0.35
Yasumatsu, Katsuharu	3	0.6
Ying, Levi C.	7	2.3
Yukami, Susumu	12	4.5
Zama, Kōichi	9	3.2493

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